# Bacteria Total Maximum Daily Load Studies for Tributaries to the Potomac River: Prince William and Stafford Counties

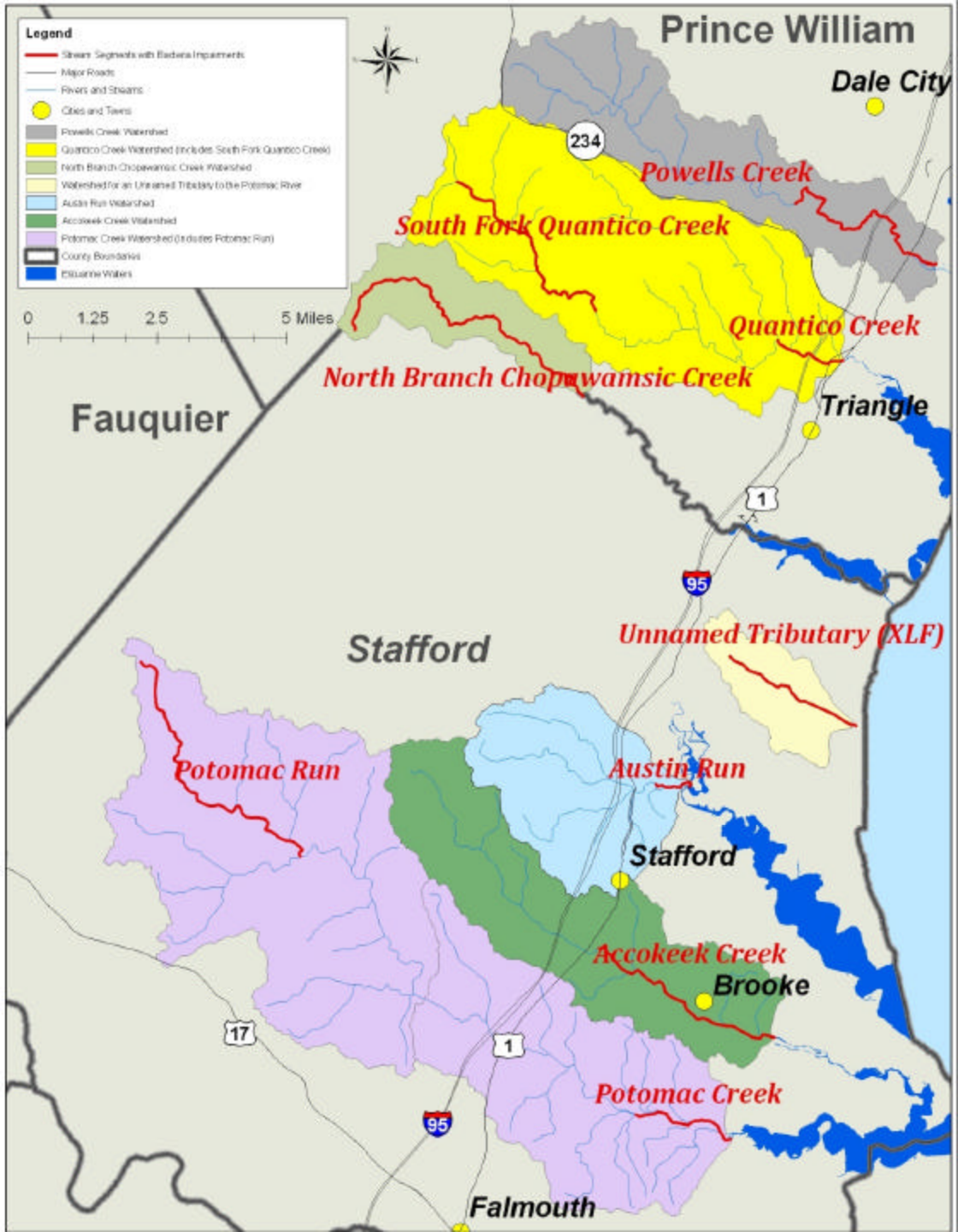
Technical Advisory Committee Meeting #3
January 4, 2012

# Meeting Agenda

- **Project Updates** (*DEQ*)
- **Technical Approach** (*Louis Berger Group*)
  - Hydrologic and Water Quality Model Calibration and Validation
  - TMDL Annual Bacteria Loadings
  - Draft TMDL Allocations
- **Next Steps** (*DEQ*)
- **Questions**

# TMDL Watersheds:

- Powells Creek
- South Fork Quantico Creek
- Quantico Creek
- North Branch Chopawamsic Creek
- Unnamed Tributary to the Potomac River
- Austin Run
- Accokeek Creek
- Potomac Creek
- Potomac Run



# Summary of Impaired Stream Segments

| **Waterbody Name** *Location* | **Segment Size** | **Cause** | **Upstream Limit** | **Downstream Limit** | **DEQ Monitoring Station(s)** *Station Location* | **Year First Listed as Impaired** | **2010 Exceedance Rate** |
|---|---|---|---|---|---|---|---|
| **Powells Creek** *Prince William County* | 4.62 miles | *E. coli* | 0.2 rivermiles below Lake Montclair | End of the free-flowing waters | **1aPOW006.11** *Northgate Drive Bridge Crossing* | 2006 | 2 of 13 samples (15.4%) |
| **Quantico Creek** *Prince William County Town of Dumfries* | 1.45 miles | *E. coli* | Confluence with South Fork Quantico Creek | Start of the tidal waters of Quantico Bay. | **1aQUA004.46** *Route 1 Bridge Crossing* | 2006 | 7 of 27 samples (25.9%) |
| **South Fork Quantico Creek** *Prince William County Town of Dumfries* | 4.63 miles | *E. coli* | Headwaters of the South Fork Quantico Creek | Start of the impounded waters | **USGS Station** *1658500* | 2004 | 7 of 47 samples (14.9%) |
| **North Branch Chopawamsic Creek** *Stafford County Prince William County* | 6.9 miles | *E. coli* | Headwaters of North Branch Chopawamsic Creek | Confluence with Middle Branch | **USGS Station** *165900* | 2004 | 2 of 17 samples (11.7%) |
| **Unnamed Tributary to the Potomac River** *Stafford County* | 2.9 miles | *E. coli* | Headwaters of the unnamed tributary | Confluence with the Potomac River | **1aXLF000.13** *Route 633 Bridge Crossing* | 2010 | 2 of 11 samples (18.2%) |

# Summary of Impaired Stream Segments

| **Waterbody Name** *Location* | **Segment Size** | **Cause** | **Upstream Limit** | **Downstream Limit** | **DEQ Monitoring Station(s)** *Station Location* | **Year First Listed as Impaired** | **2010 Exceedance Rate** |
|---|---|---|---|---|---|---|---|
| **Austin Run** *Fauquier County Stafford County* | 0.79 miles | *E. coli* | Confluence with an unnamed tributary (streamcode XGQ) | Confluence with Aquia Creek | **1aAUS000.49** *End of Aquia Drive* | 2010 | 2 of 10 samples (20.0%) |
| **Accokeek Creek** *Stafford County* | 4.21 miles | *E. coli* | Confluence with an unnamed tributary | End of the free-flowing waters | **1aACC006.13** *Route 608 Bridge Crossing* | 2006 | 4 of 23 samples (17.4%) |
| **Potomac Creek** *Stafford County* | 2.18 miles | *E. coli* | Railroad crossing at the west end of swamp, upstream from Route 608 | Downstream until the east end of swamp | **1aPOM006.72** Route 608 Bridge Crossing | 2006 | 4 of 13 samples (30.8%) |
| **Potomac Run** *Stafford County* | 6.13 miles | *E. coli* | Headwaters of Potomac Run | Confluence with Long Branch | **1aPOR000.40** (Route 648 Bridge Crossing) | 2006 | 10 of 13 samples (76.9%) |

# Follow-Up From TAC Meeting #2

- Updated Source Assessment
  - Updated Livestock numbers for Stafford County based on input from county and DCR.
  - Aquia Creek Segment was removed from TMDL Development (will be delisted for bacteria in the 2012 Integrated Assessment).
  - Updated how straight pipes were represented in the model.

# Old Method For Estimating Loads From Septic Systems and Straight Pipes

***OLD Method: Loadings were estimated using an assumed failure rate (3%) for septic systems and assuming all Houses on "Other Means" were straight pipes.***

| Impaired Watershed | Houses on Septic Systems | Failing Septic Systems | Houses on "Other Means" *Originally Assumed to be Straight Pipes* |
|---|---|---|---|
| Powells Creek | 1,354 | 41 | 37 |
| Quantico Creek / South Fork Quantico Creek | 505 | 15 | 14 |
| North Branch Chopawamsic Creek | 4 | 0 | 0 |
| Unnamed Tributary to Potomac River | 179 | 5 | 7 |
| Austin Run | 3,291 | 99 | 125 |
| Accokeek Creek | 1,110 | 33 | 42 |
| Potomac Creek / Potomac Run | 1,373 | 41 | 52 |

*1. Census 2009 estimates*

*2. Based upon 2009 census estimate and ratio of parameter: 1990 census estimate*

*3. Based on a septic failure rate of 3% (VA DEQ 2011)*

# New Method For Estimating Loads From Failing Septic Systems and Straight Pipes

***NEW Method: Loadings were estimated using an assumed failure rate (3%) for septic systems and for houses on "Other Means."***

| Impaired Watershed | Septic Systems | | Houses on "Other Means" *(Originally Assumed to be Straight Pipes)* | | *Estimated Number of Houses with a Failing Sewage Disposal System (Failing Septic Systems and Straight Pipes)* |
|---|---|---|---|---|---|
| | Number of Houses | Estimated Number of Failing Systems | Number of Houses | Estimated Number of Failing Systems | |
| Powells Creek | 1,354 | 41 | 37 | 1 | 42 |
| Quantico Creek / South Fork Quantico Creek | 505 | 15 | 14 | 1 | 16 |
| North Branch Chopawamsic Creek | 4 | 0 | 0 | 0 | 0 |
| Unnamed Tributary to the Potomac River | 179 | 5 | 7 | 1 | 6 |
| Austin Run | 3,291 | 99 | 125 | 4 | 102 |
| Accokeek Creek | 1,110 | 33 | 42 | 2 | 35 |
| Potomac Creek / Potomac Run | 1,373 | 41 | 52 | 2 | 43 |

*[1] Census 2009 estimates*

*[2] Based upon 2009 census estimate and ratio of parameter: 1990 census estimate*

*[3] Based on a septic failure rate of 3% (VA DEQ 2011)*

# HSPF Model

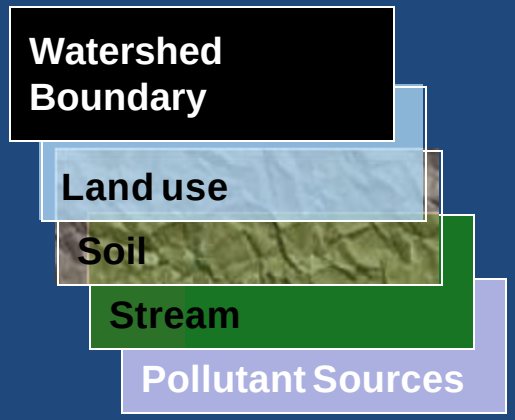
# HSPF Model

## Linking Sources to Water Quality

Input → Model → Output

**Factors:**

- Rainfall events
- Fecal coliform build up
- Fecal coliform direct deposition
- Fecal coliform wash off
- Fecal coliform die off rates




Watershed Response

# Source Loading Estimates

- Determine the daily fecal coliform production by source
- Estimate the size/number of each source
- Determine whether the source is:
  - Direct Source
  - Indirect Source
- Calculate the load to each land use based on a monthly schedule and for each source
- The sum of all individual sources is the total load

# MS4s

## Municipal Separate Storm Sewer System Permits

| Permit Number | MS4 Permit | MS4 Geographical Area |
|---|---|---|
| **Powells Creek (A26R-02-BAC)** | | |
| VA0088595 | Prince William County | Prince William County |
| VAR040100 | Prince William County Public Schools | |
| VAR040115 | Virginia Department of Transportation | |
| | | |
| **Quantico Creek (A26R-03-BAC) & South Fork Quantico Creek (A26R-05-BAC)** | | |
| VA0088595 | Prince William County | Prince William County |
| VAR040100 | Prince William County Public Schools | |
| VAR040115 | Virginia Department of Transportation | |
| VAR040117 | Town of Dumfries | Town of Dumfries |
| VAR040115 | Virginia Department of Transportation | |
| | | |
| North **Branch Chopawamsic Creek (A26R-04-BAC)** | | |
| VA0088595 | Prince William County | Prince William County |
| VAR040100 | Prince William County Public Schools | |
| VAR040115 | Virginia Department of Transportation | |
| VAR040069 | United States Marine Corps, Quantico | |
| | | |

# MS4s (Continued)

| Permit Number | MS4 Permit | MS4 Geographical Area |
|---|---|---|
| **Unnamed Tributary to Potomac River (A26R-07-BAC)** | | |
| VAR040056 | Stafford County | Stafford County |
| VAR040071 | Stafford County Public Schools | |
| VAR040115 | Virginia Department of Transportation | |
| | | |
| **Austin Run (A28R-01-BAC)** | | |
| VAR040056 | Stafford County | Stafford County |
| VAR040071 | Stafford County Public Schools | |
| VAR040115 | Virginia Department of Transportation | |
| | | |
| **Accokeek Creek (A29R-01-BAC)** | | |
| VAR040056 | Stafford County | Stafford County |
| VAR040071 | Stafford County Public Schools | |
| VAR040115 | Virginia Department of Transportation | |
| | | |
| **Potomac Creek (A29R-02-BAC) & Potomac Run (A29R-03-BAC)** | | |
| VAR040056 | Stafford County | Stafford County |
| VAR040115 | Virginia Department of Transportation | |
| | | |

# Virginia Pollutant Discharge Elimination System (VPDES) Point Source Inventory

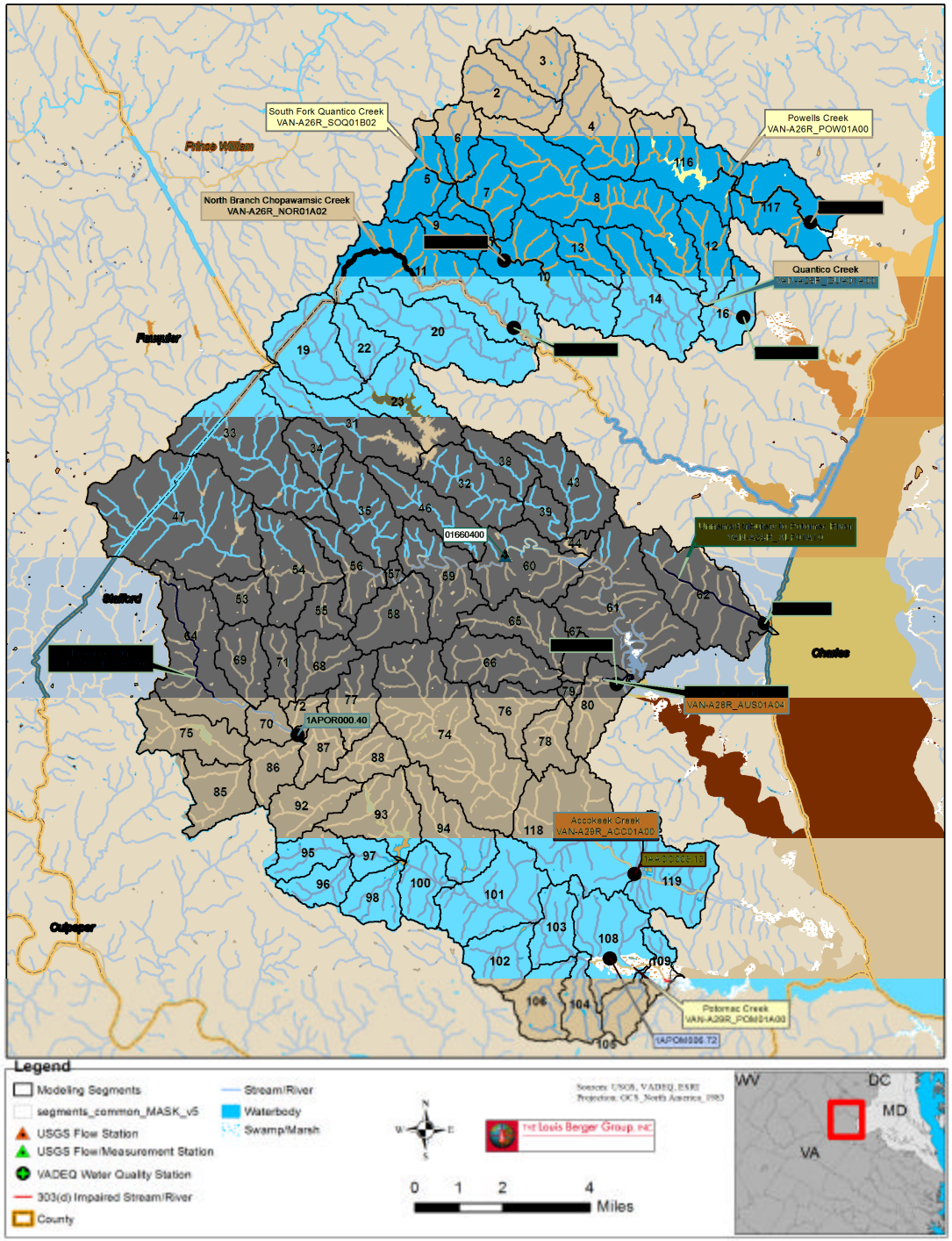
## (VA Department of Environmental Quality)

| Permit Number | Permit Type | Facility Name | Watershed | Max Design Flow (MGD) | Permit Concentration (cfu/100 ml) |
|---|---|---|---|---|---|
| VA0092479 | Municipal, Minor | Abrahms Ct STP* | Austin Run | 0.0036 | 126 |
| VA0060968 | Municipal, Major | Aquia Wastewater Treatment Plant | Austin Run | 12 | 126 |
| VA0089630 | Municipal, Minor | Randall STP | Accokeek Creek | 0.0008 | 126 |
| VAG406114 | General Permit Domestic Sewage | Business | Unnamed Tributary to Potomac River | 0.001 | 126 |
| VAG406207 | General Permit Domestic Sewage | Residence | Accokeek Creek | 0.001 | 126 |

* *This permit is still in draft form and has not been officially issued.*

# HSPF Model Setup

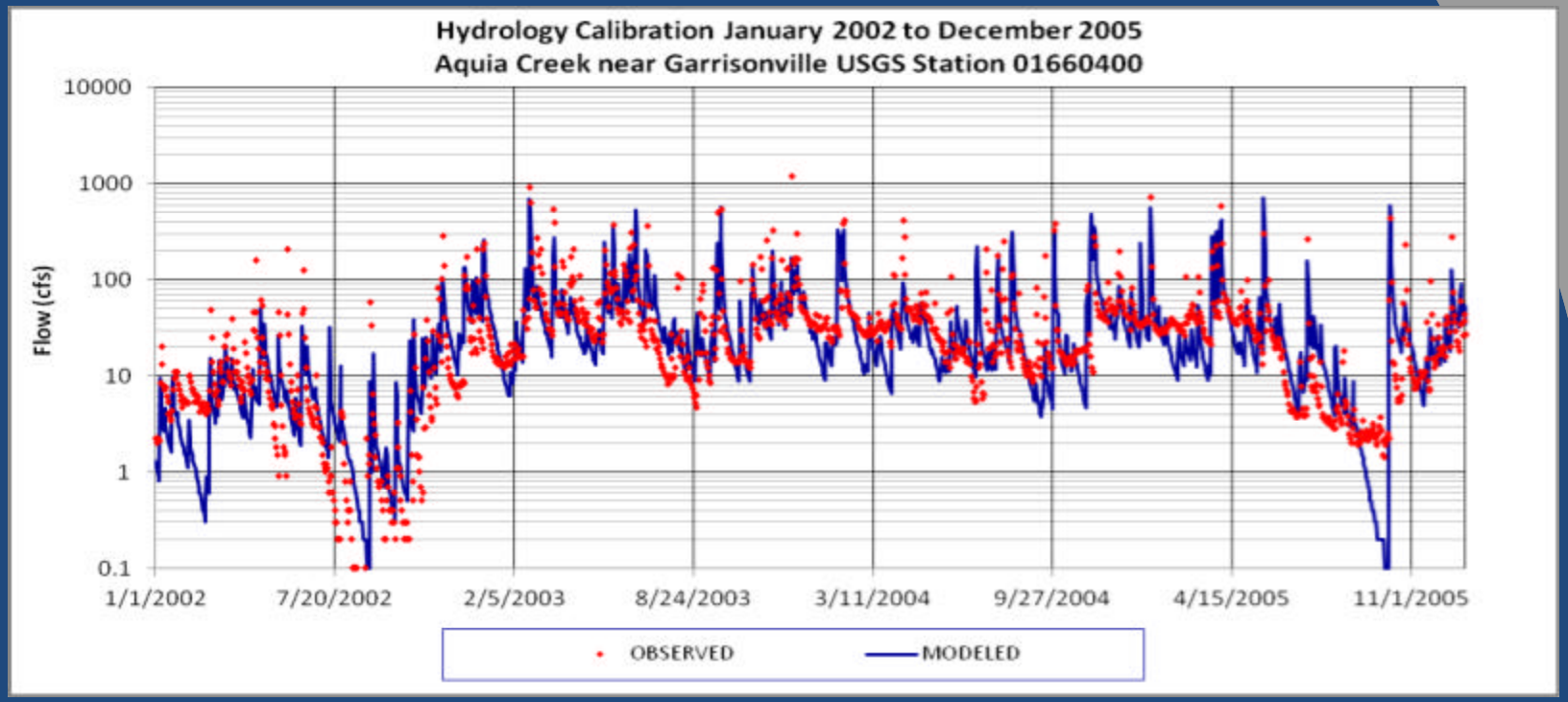
- Hydrologic Modeling Area delineated to 84 model segments for bacteria loadings
  - Hydrologic Model Calibration/Validation
    - USGS Flow Station 01660400: Aquia Creek near Garrisonville, VA
      - Calibration period: 2002- 2005
      - Validation period: 2006-2010
- Water quality Model Calibration/Validation
    - Using DEQ water quality stations on impaired segment
      - Calibration period: 2006- 2010
  - TMDL Calculation
- Weather data:
  - NCDC data from Reagan National Airport




# HSPF Segments - Flow and Water Quality Calibration Stations

***Note: Model segments in the Aquia Watershed were included to model hydrology only.***

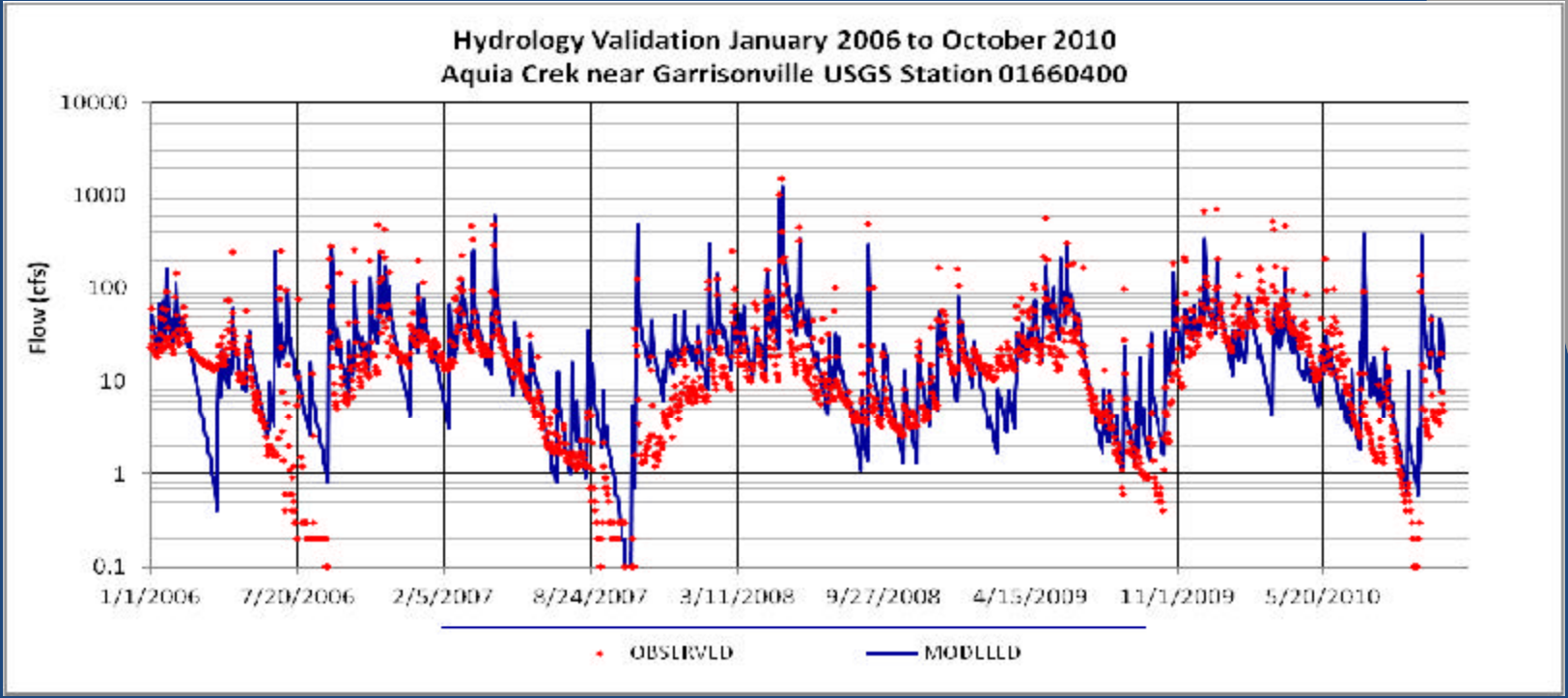
# HSPF Hydrological Calibration




| Category | Simulated | Observed |
|---|---|---|
| Total runoff, in inches | 53.490 | 55.530 |
| Total of highest 10% flows, in inches | 24.930 | 25.151 |
| Total of lowest 50% flows, in inches | 8.040 | 8.757 |
| Total storm volume, in inches | 4.020 | 3.047 |
| Baseflow recession rate | 0.910 | 0.920 |
| Summer flow volume, in inches | 11.190 | 8.658 |
| Winter flow volume, in inches | 15.770 | 17.246 |
| Summer storm volume, in inches | 0.400 | 0.294 |

| Category | Current | Criterion |
|---|---|---|
| Error in total volume | -3.700 | ± 10.000 |
| Error in low flow recession | 0.010 | ± 0.010 |
| Error in 50% lowest flows | -8.200 | ± 10.000 |
| Error in 10% highest Flow | -0.900 | ± 15.000 |
| Seasonal volume error | 37.8 | ± 10.000 |

# HSPF Hydrological Validation




| Category | Simulated | Observed |
|---|---|---|
| Total runoff, in inches | 42.890 | 43.14 |
| Total of highest 10% flows, in inches | 21.410 | 24.38 |
| Total of lowest 50% flows, in inches | 4.120 | 3.85 |
| Total storm volume, in inches | 4.640 | 5.38 |
| Baseflow recession rate | 0.920 | 0.91 |
| Summer flow volume, in inches | 6.280 | 5.55 |
| Winter flow volume, in inches | 10.380 | 12.07 |
| Summer storm volume, in inches | 0.090 | 0.48 |

| Category | Current | Criterion |
|---|---|---|
| Error in total volume | -0.600 | ± 10.000 |
| Error in low flow recession | -0.010 | ± 0.010 |
| Error in 50% lowest flows | 7.100 | ± 10.000 |
| Error in 10% highest Flow | -12.20 | ± 15.000 |
| Seasonal volume error | 27.20 | ± 10.000 |

## FECAL INDICATOR TOOL

- Estimate source loadings of fecal coliform.
- Generate input data for Water Quality HSPF

## HSPF Model

Generates output of fecal coliform time series

## TRANSLATION

Time series of fecal coliform concentrations to *E. coli* concentrations

## CALIBRATION

Comparison of simulated *E. coli* loads to observed data

# Water Quality Calibration Stations

| Location | WQ Station | Segment |
|---|---|---|
| Powells Creek | 1APOW003.11 | 117 |
| Quantico Creek | 1AQUA004.46 | 16 |
| South Fork Quantico Creek | 1ASOQ006.73 | 10 |
| North Branch Chopawamsic Creek | 1ANOR009.87 | 11 |
| Unnamed Tributary to Potomac River | 1AXLF000.13 | 62 |
| Austin Run | 1AAUS000.49 | 80 |
| Accokeek Creek | 1AACC006.13 | 118 |
| Potomac Creek | 1APOM006.72 | 108 |
| Potomac Run | 1APOR000.40 | 70 |

# TMDL Expression

$$TMDL = \sum LA + \sum WLA + MOS$$

LA = Load allocation (nonpoint source contribution)

WLA = Waste load allocation (point source contribution)

MOS = Margin of safety

# TMDL Allocation Strategy

- Human Sources
  - Straight Pipes
  - Failed Septic Systems
- Non-Point Sources:
  - Direct Deposition
  - Indirect (Agriculture and Urban runoff)
- Wildlife Sources:
  - Direct and Indirect

# TMDL Allocation Objective

Zero exceedances of the *E. coli* Geometric Mean Criterion (126 cfu/100mL)
No more than 10% exceedance rate of the Maximum Assessment Criterion (235 cfu/100mL)

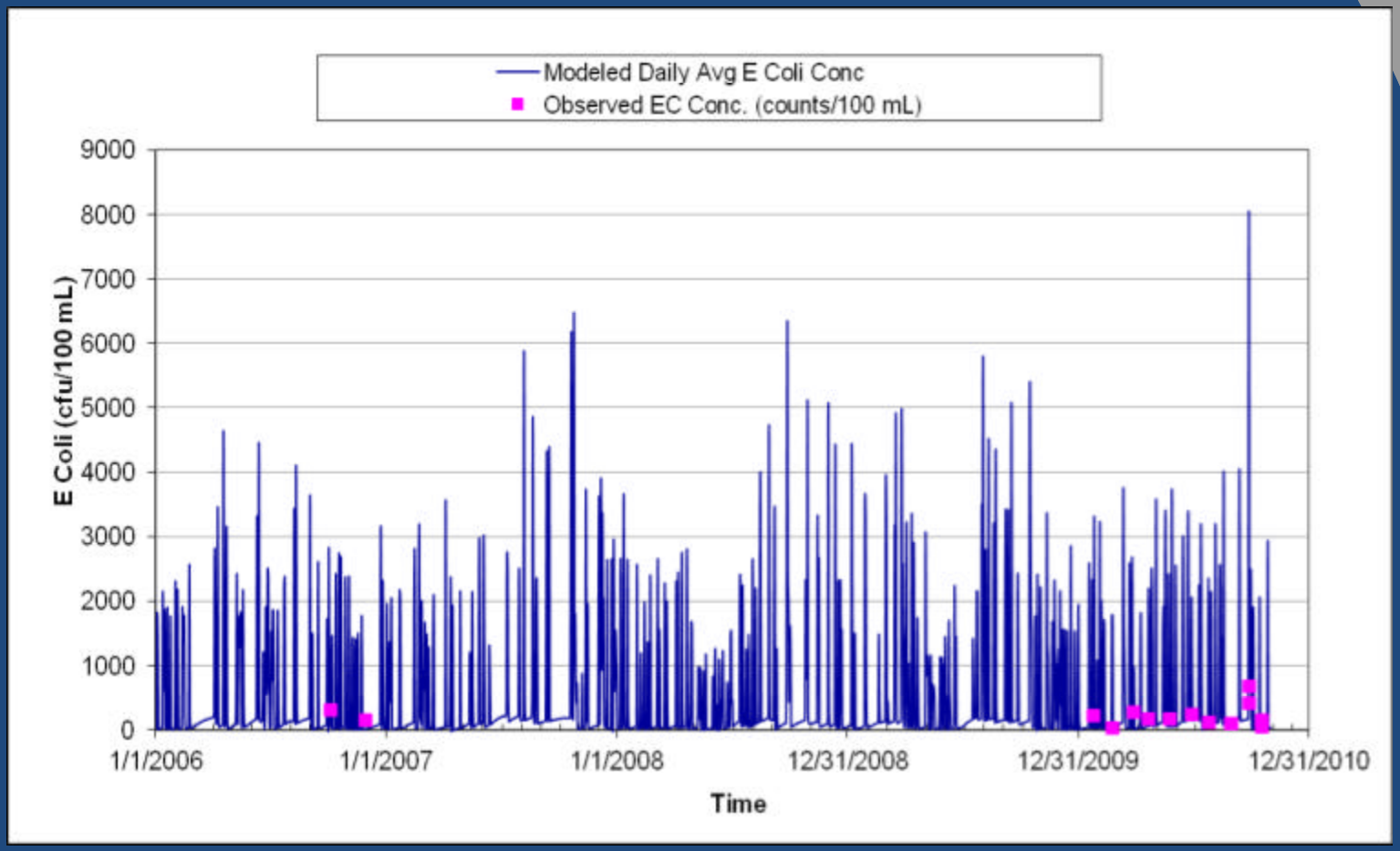
- **Allocation Scenarios consist of an iterative process using HSPF simulation runs with varying percent reduction from each source.**
- **Allocation scenarios target anthropogenic sources first (failing septics, straight pipes, etc.).**
- **The objective is to identify a scenario that meets the Geometric Mean and the Maximum Assessment Criteria.**

# Results for Each TMDL Watershed

Four slides for each impaired watershed:

1. Water Quality Calibration
2. Existing Bacteria Loads
3. TMDL Scenarios
4. TMDL Bacteria Loads and Percent Reductions

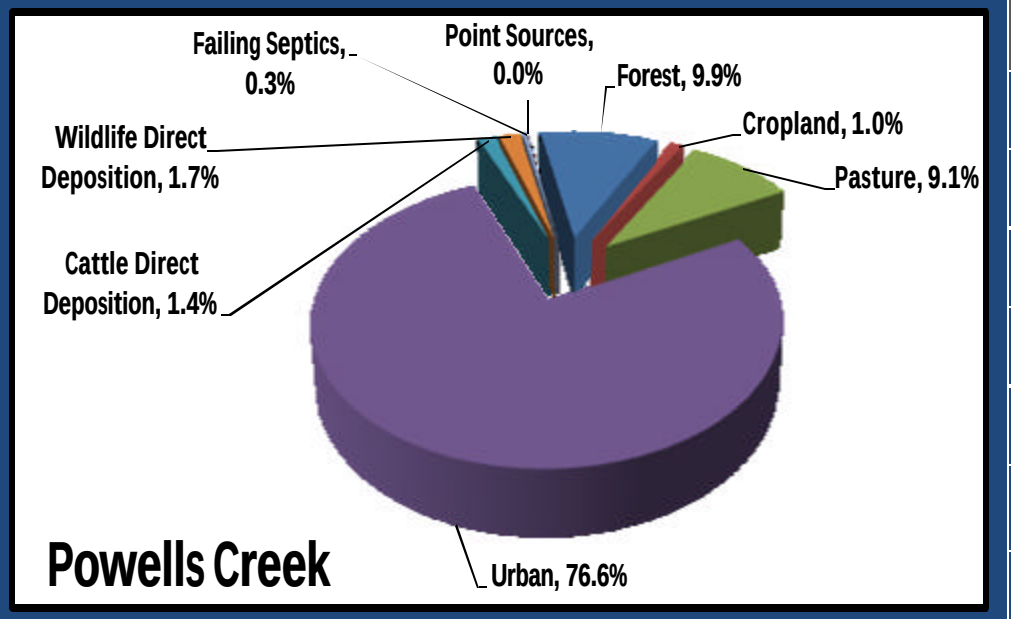
# WQ Calibration – Powells Creek (1APOW003.11)




| *E. coli* Geometric Mean | |
|---|---|
| Simulated | Observed |
| 140 | 143 |

| Percent Exceedance of the *E. coli* Maximum Assessment Criterion | |
|---|---|
| Simulated | Observed |
| 32 | 31 |

# DRAFT Powells Creek *E. coli* Existing Annual Loading

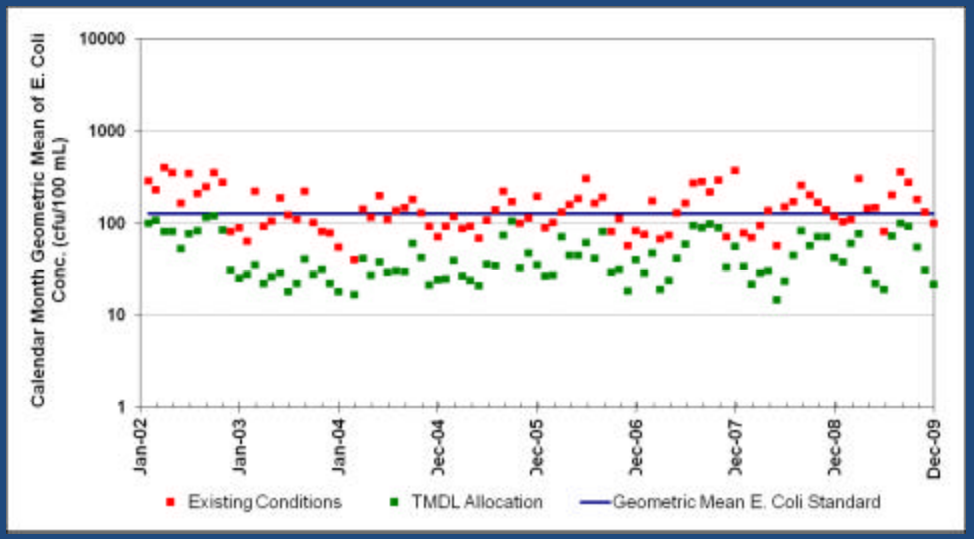


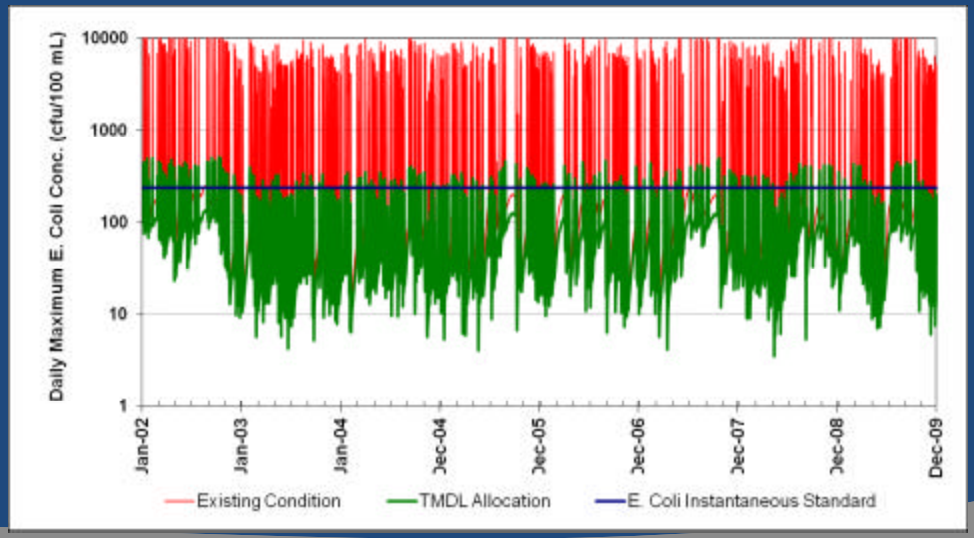

| Source | Annual Average *E. coli* Existing Loads | |
|---|---|---|
| | cfu/yr | % |
| Forest | 1.49E+13 | 9.9% |
| Cropland | 1.44E+12 | 1.0% |
| Pasture | 1.36E+13 | 9.1% |
| Urban | 1.15E+14 | 76.6% |
| Cattle Direct Deposition | 2.09E+12 | 1.4% |
| Wildlife Direct Deposition | 2.62E+12 | 1.7% |
| Failing Septics | 4.04E+11 | 0.3% |
| VPDES Point Sources | 0.00E+00 | 0.0% |
| **Total** | **1.50E+14** | **100.0%** |

# Powells Creek TMDL Scenarios

| Scenario | Failing Sewage Disposal Systems | Direct Deposition from Cattle | Non-Point Source Agriculture | Non-Point Source Urban | Non-Point Source Forest (Wildlife) | Direct Deposition from Wildlife | Percent Exceedance of the *E. Coli* Geometric Mean Criterion | Percent Exceedance of the *E. Coli* Maximum Assessment Criterion |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | 55% | 32% |
| 1 | 100 | | | | | | 55% | 32% |
| 2 | 100 | 50 | | | | | 46% | 31% |
| 3 | 100 | 100 | | | | | 30% | 31% |
| 4 | 100 | 100 | 100 | 100 | 100 | | 0% | 0% |
| 5 | 100 | 100 | | | | 50 | 15% | 31% |
| 6 | 100 | 100 | | | | 75 | 4% | 31% |
| 7 | 100 | 100 | 95 | 95 | 95 | | 1% | 17% |
| 8 | 100 | 100 | 85 | 85 | 85 | | 7% | 23% |
| 9 | 100 | 100 | 90 | 90 | 90 | | 3% | 21% |
| 10 | 100 | 50 | 50 | 50 | 50 | | 32% | 28% |
| 11 | 100 | 75 | 75 | 75 | 75 | | 18% | 26% |
| 12 | 100 | 100 | | | | 100 | 0% | 31% |
| **13** | **100** | **100** | **98.0** | **98.0** | **84.4** | **0** | **0%** | **10%** |

# DRAFT Powells Creek TMDL Allocation

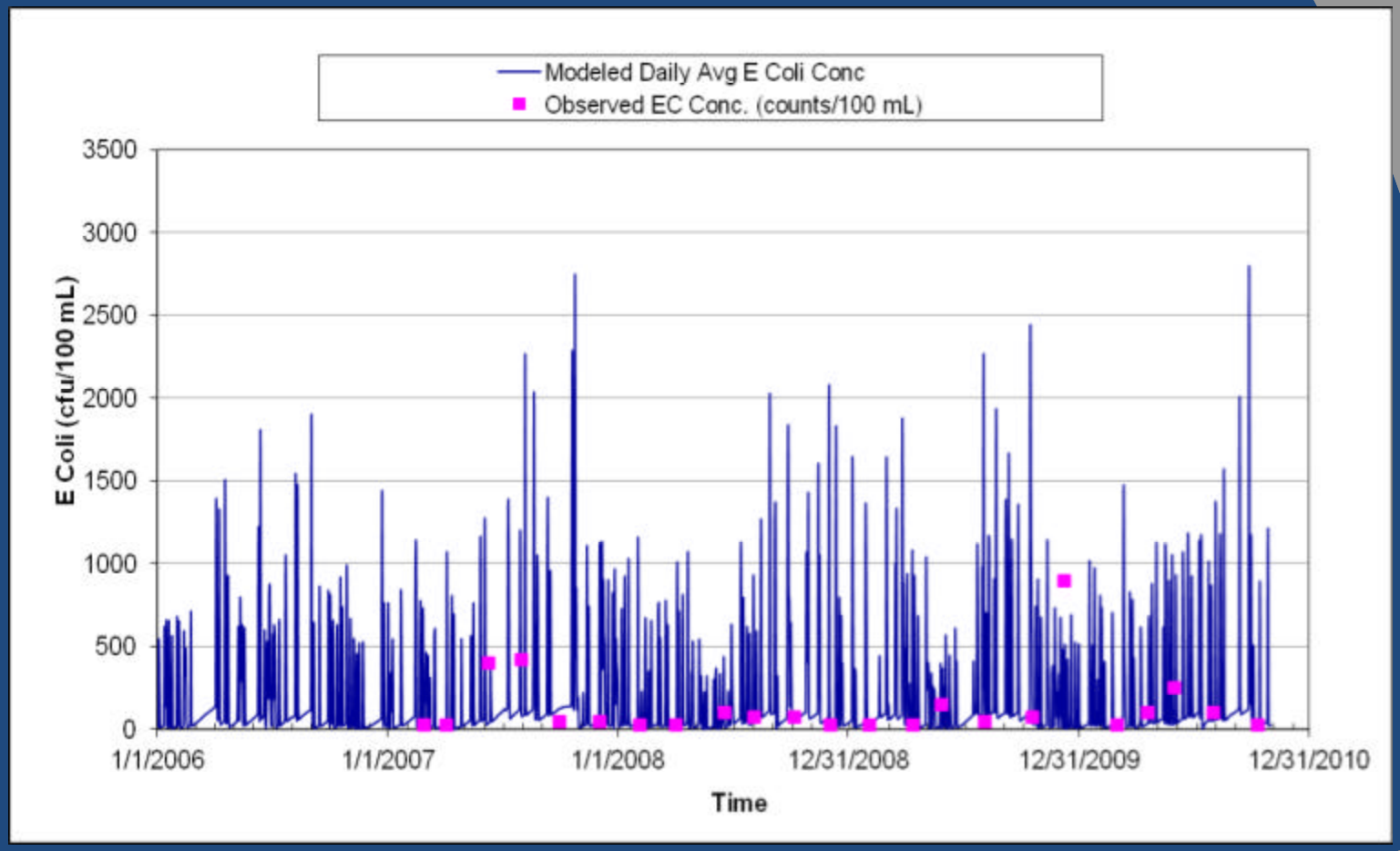



| Land Use/Source | Annual Average *E. coli* Loads (cfu/yr) | | Reduction (%) |
|---|---|---|---|
| | Existing | Allocation | |
| Forest | 1.49E+13 | 2.33E+12 | 84.4% |
| Cropland | 1.44E+12 | 2.88E+10 | 98.0% |
| Pasture | 1.36E+13 | 2.72E+11 | 98.0% |
| Urban (Pets) | 1.15E+14 | 2.30E+12 | 98.0% |
| Cattle - direct deposition | 2.09E+12 | 0.00E+00 | 100% |
| Wildlife - direct deposition | 2.62E+12 | 2.62E+12 | 0% |
| Failing Sewage Disposal Systems | 4.04E+11 | 0.00E+00 | 100% |
| Permitted Point Sources* | 0.00E+00 | 7.55E+10 | - |

**Draft allocation for Permitted Point Sources includes an allowance for the future growth and expansion of point sources in the watershed.*

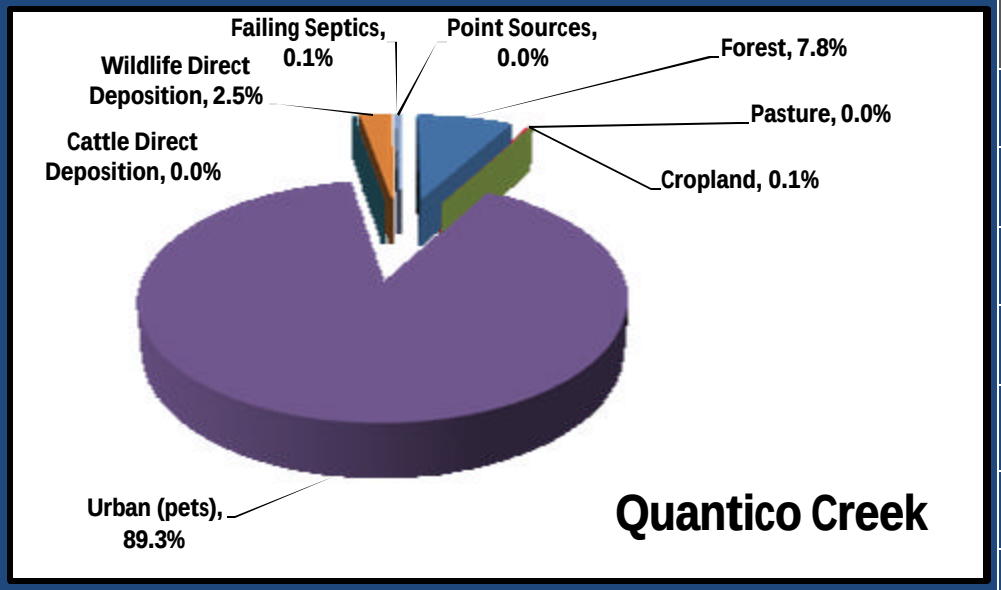
# WQ Calibration – Quantico Creek (1AQUA004.46)




| *E. coli* Geometric Mean | |
|---|---|
| Simulated | Observed |
| 70 | 82 |

| Percent Exceedance of the *E. coli* Maximum Assessment Criterion | |
|---|---|
| Simulated | Observed |
| 26 | 24 |

# DRAFT Quantico Creek *E. coli* Existing Annual Loading

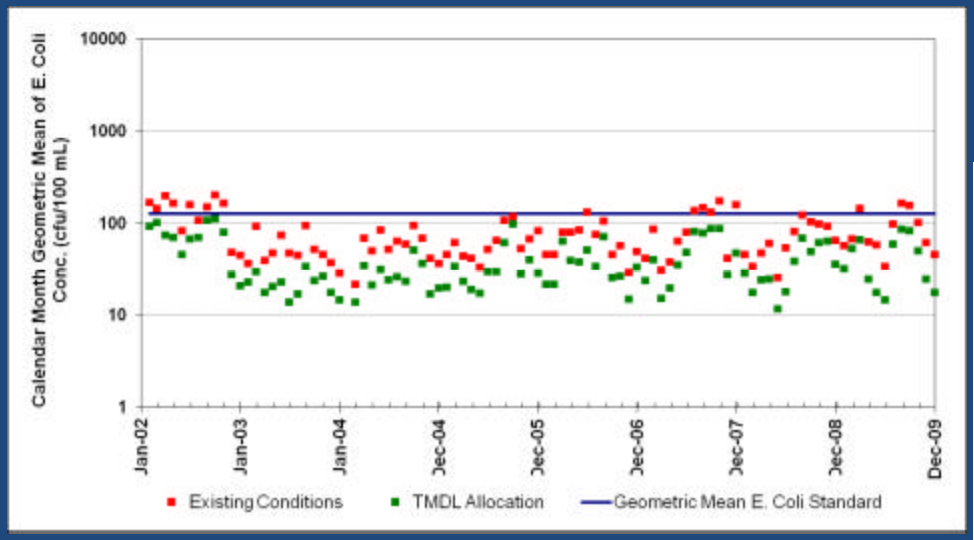


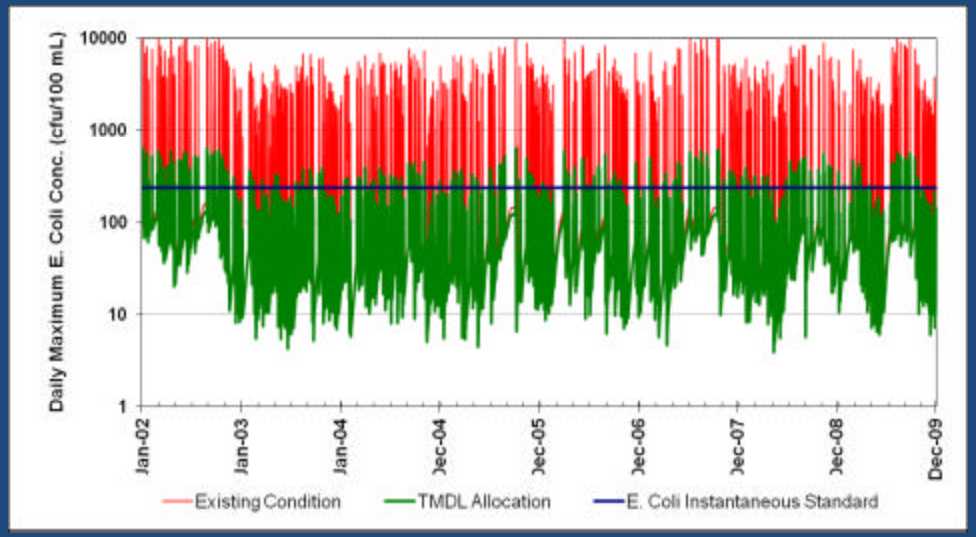

| Source | Annual Average *E. coli* Existing Loads | |
|---|---|---|
| | cfu/yr | % |
| Forest | 7.59E+12 | 7.8% |
| Cropland | 6.88E+10 | 0.1% |
| Pasture | 4.21E+10 | 0.0% |
| Urban | 8.64E+13 | 89.3% |
| Cattle Direct Deposition | 2.34E+10 | 0.0% |
| Wildlife Direct Deposition | 2.47E+12 | 2.5% |
| Failing Septics | 1.37E+11 | 0.1% |
| Point Sources | 0.00E+00 | 0.0% |
| **Total** | **9.67E+13** | **100.0%** |

# Quantico Creek Scenarios

| Scenario | Failing Sewage Disposal Systems | Direct Deposition from Cattle | Non-Point Source Agriculture | Non-Point Source Urban | Non-Point Source Forest (Wildlife) | Direct Deposition from Wildlife | Percent Exceedance of the *E. Coli* Geometric Mean Criterion | Percent Exceedance of the *E. Coli* Maximum Assessment Criterion |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | 18% | 27% |
| 1 | 100 | | | | | | 18% | 27% |
| 2 | 100 | 50 | | | | | 17% | 27% |
| 3 | 100 | 100 | | | | | 16% | 27% |
| 4 | 100 | 100 | 100 | 100 | 100 | | 0% | 1% |
| 5 | 100 | 100 | | | | 50 | 0% | 26% |
| 6 | 100 | 100 | | | | 75 | 0% | 26% |
| 7 | 100 | 100 | 95 | 95 | 95 | | 0% | 11% |
| 8 | 100 | 100 | 85 | 85 | 85 | 0 | 1% | 19% |
| 9 | 100 | 100 | 90 | 90 | 90 | 0 | 0% | 17% |
| 10 | 100 | 50 | 50 | 50 | 50 | 0 | 9% | 25% |
| 11 | 100 | 75 | 75 | 75 | 75 | 0 | 1% | 22% |
| 12 | 100 | 100 | | | | 100 | 0% | 26% |
| **13** | **100** | **100** | **98.6** | **98.6** | **0** | **0** | **0%** | **9%** |

# DRAFT Quantico Creek TMDL Allocation

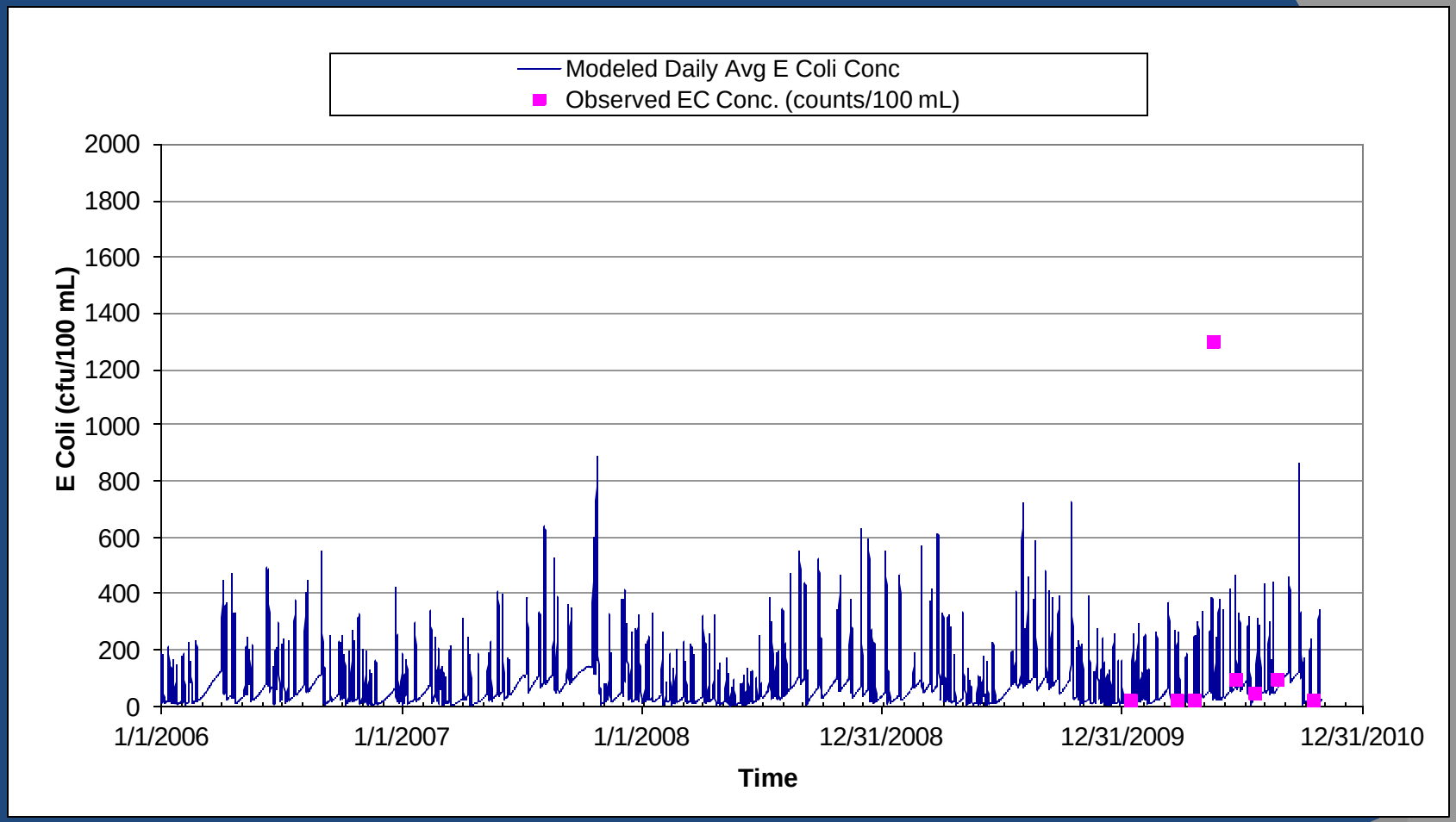



| Land Use/Source | Annual Average *E. coli* Loads (cfu/yr) | | Reduction (%) |
|---|---|---|---|
| | Existing | Allocation | |
| Forest | 7.59E+12 | 7.59E+12 | 0.0% |
| Cropland | 6.88E+10 | 9.64E+08 | 98.6% |
| Pasture | 4.21E+10 | 5.89E+08 | 98.6% |
| Urban (Pets) | 8.64E+13 | 1.21E+12 | 98.6% |
| Cattle - direct deposition | 2.34E+10 | 0.00E+00 | 100.0% |
| Wildlife - direct deposition | 2.47E+12 | 2.47E+12 | 0.0% |
| Failing Septic - direct deposition | 1.37E+11 | 0.00E+00 | 100.0% |
| Permitted Point Sources* | 0.00E+00 | 1.13E+11 | - |

**Draft allocation for Permitted Point Sources includes an allowance for the future growth and expansion of point sources in the watershed.*

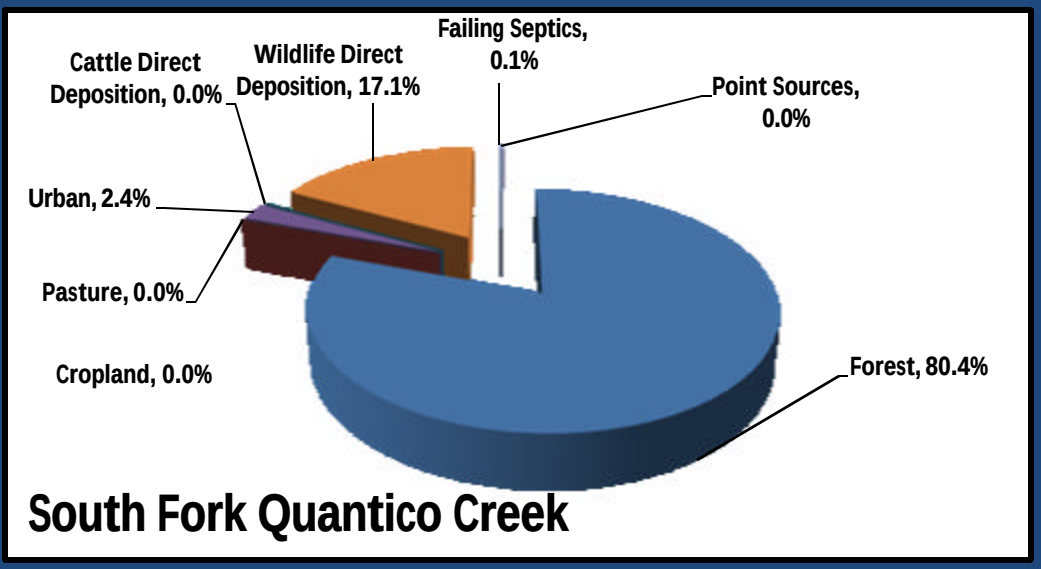
# WQ Calibration – South Fork Quantico Creek (1ASOQ006.73)




| *E. coli* Geometric Mean | |
|---|---|
| Simulated | Observed |
| 54 | 63 |

| Percent Exceedance of the *E. coli* Maximum Assessment Criterion | |
|---|---|
| Simulated | Observed |
| 20 | 13 |

# DRAFT South Fork Quantico Creek *E. coli* Existing Annual Loading

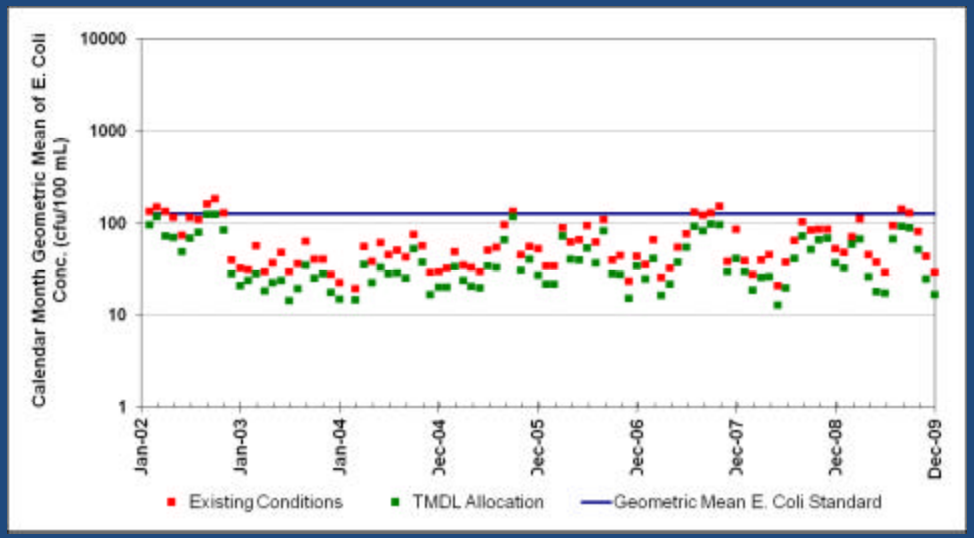


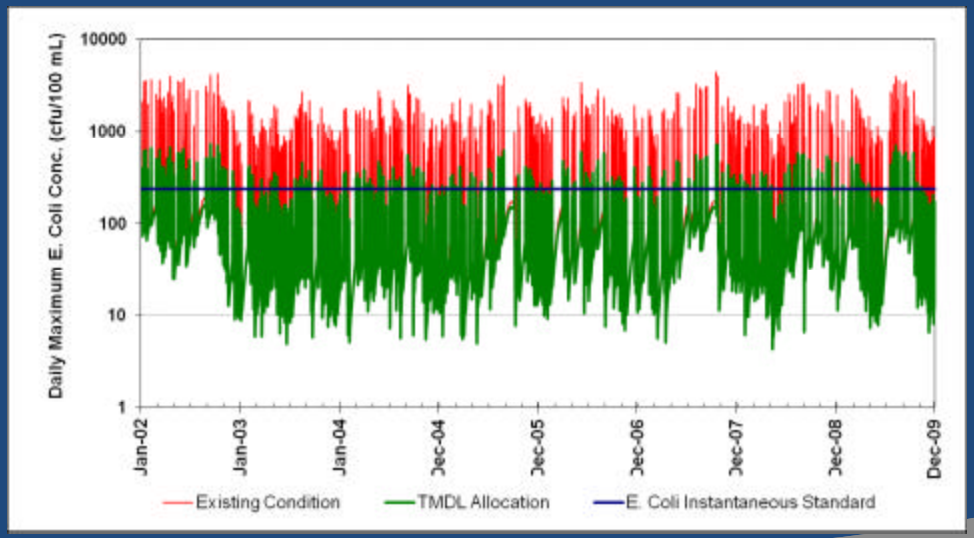

| Source | Annual Average *E. coli* Existing Loads | |
|---|---|---|
| | cfu/yr | % |
| Forest | 6.09E+12 | 80.4% |
| Cropland | 1.78E+09 | 0.0% |
| Pasture | 3.94E+08 | 0.0% |
| Urban | 1.83E+11 | 2.4% |
| Cattle Direct Deposition | 2.37E+09 | 0.0% |
| Wildlife Direct Deposition | 1.30E+12 | 17.1% |
| Failing Septics | 5.52E+09 | 0.1% |
| Point Sources | 0.00E+00 | 0.0% |
| Total | 7.58E+12 | 100% |

# South Fork Quantico Creek Scenarios

| Scenario | Failing Sewage Disposal Systems | Direct Deposition from Cattle | Non-Point Source Agriculture | Non-Point Source Urban | Non-Point Source Forest (Wildlife) | Direct Deposition from Wildlife | Percent Exceedance of the *E. Coli* Geometric Mean Criterion | Percent Exceedance of the *E. Coli* Maximum Assessment Criterion |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | 13% | 22% |
| 1 | 100 | | | | | | 13% | 22% |
| 2 | 100 | 50 | | | | | 12% | 22% |
| 3 | 100 | 100 | | | | | 12% | 22% |
| 4 | 100 | 100 | 100 | 100 | | | 3% | 16% |
| 5 | 100 | 100 | | | | 50 | 1% | 23% |
| 6 | 100 | 100 | | | | 75 | 1% | 23% |
| 7 | 100 | 100 | 95 | 95 | 95 | | 0% | 2% |
| 8 | 100 | 100 | 85 | 85 | 85 | 0 | 0% | 6% |
| 9 | 100 | 100 | 90 | 90 | 90 | 0 | 0% | 3% |
| 10 | 100 | 50 | 50 | 50 | 50 | 0 | 2% | 13% |
| 11 | 100 | 75 | 75 | 75 | 75 | 0 | 0% | 12% |
| 12 | 100 | 100 | | | | 100 | 0% | 18% |
| **13** | **100** | **100** | **95** | **95** | **76** | **0** | **0%** | **10%** |

# DRAFT South Fork Quantico Creek TMDL Allocation

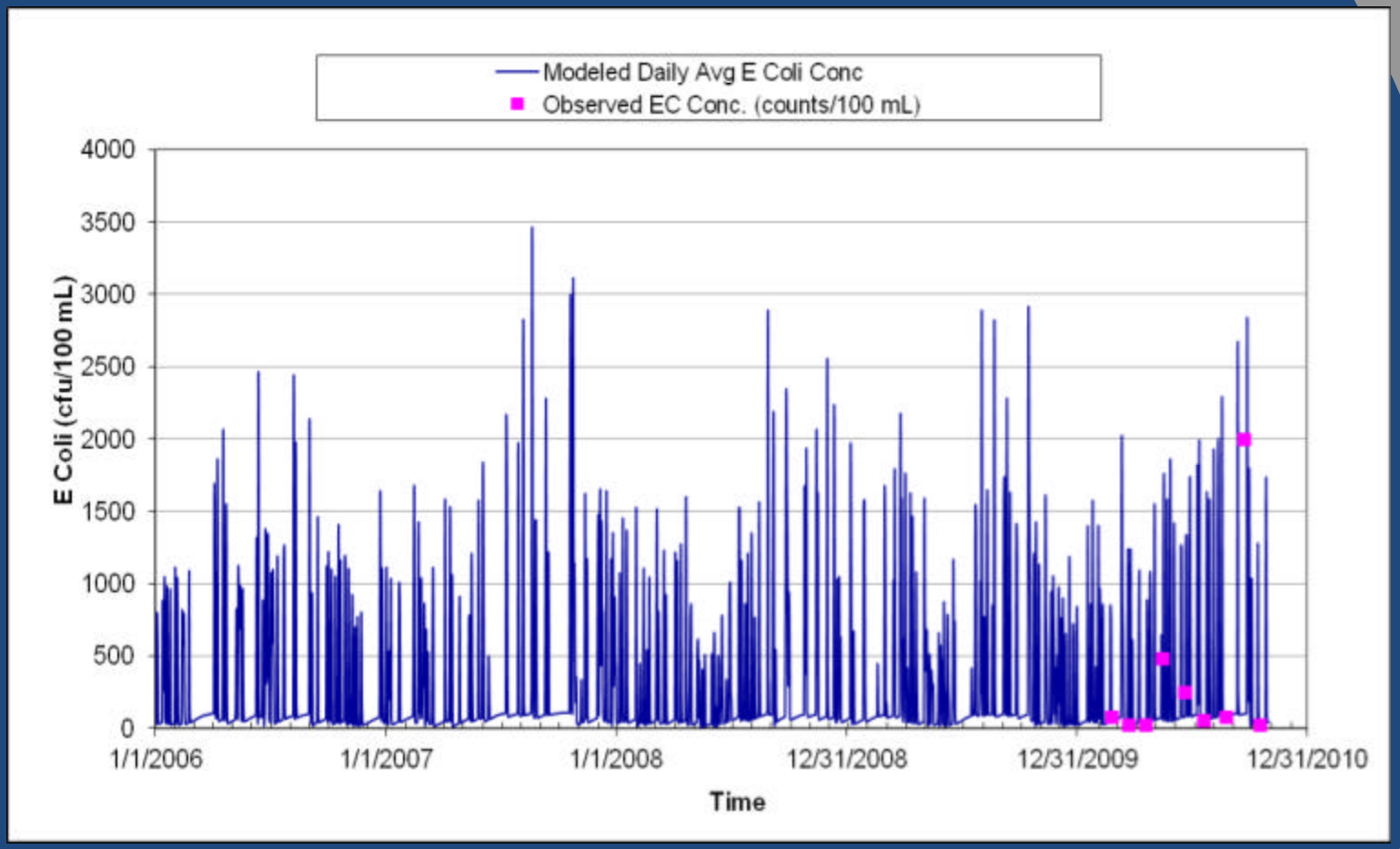



| Land Use/Source | Annual Average *E. coli* Loads (cfu/yr) | | Reduction (%) |
|---|---|---|---|
| | Existing | Allocation | |
| Forest | 6.09E+12 | 1.46E+12 | 76.0% |
| Cropland | 1.78E+09 | 8.92E+07 | 95.0% |
| Pasture | 3.94E+08 | 1.97E+07 | 95.0% |
| Urban | 1.83E+11 | 9.15E+09 | 95.0% |
| Cattle - direct deposition | 2.37E+11 | 0.00E+00 | 100.0% |
| Wildlife - direct deposition | 1.30E+12 | 1.30E+12 | 0.0% |
| Failing Septic - direct deposition | 5.52E+09 | 0.00E+00 | 100.0% |
| Permitted Point Sources* | 0.00E+00 | 2.77E+10 | - |

**Draft allocation for Permitted Point Sources includes an allowance for the future growth and expansion of point sources in the watershed.*

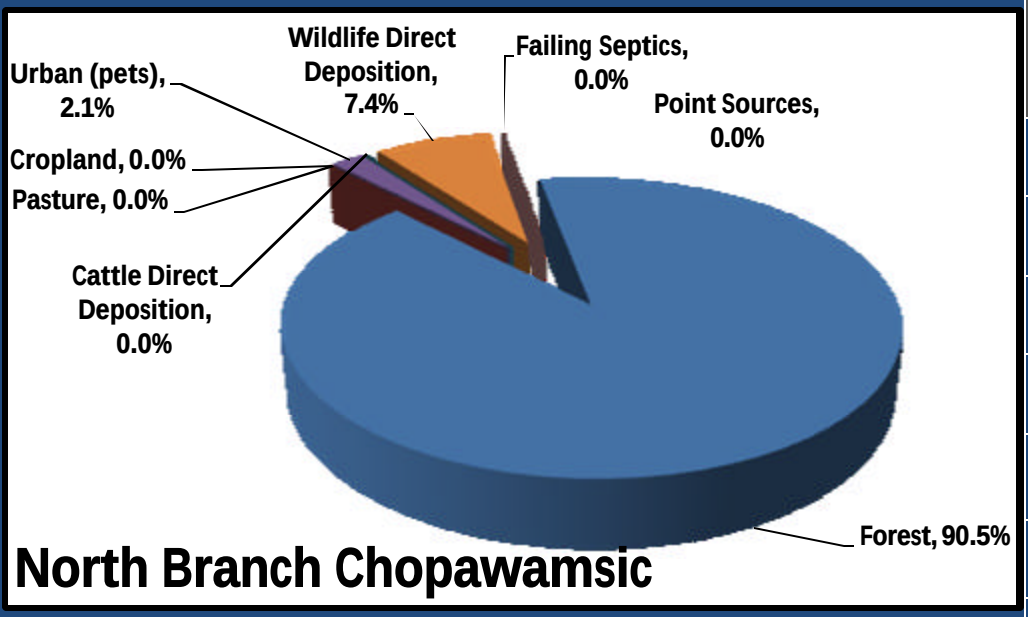
# WQ Calibration – North Branch Chopawamsic Creek (1ANOR009.87)




| *E. coli* Geometric Mean | |
|---|---|
| Simulated | Observed |
| 102 | 101 |

| Percent Exceedance of the *E. coli* Maximum Assessment Criterion | |
|---|---|
| Simulated | Observed |
| 29 | 33 |

# DRAFT North Branch Chopawamsic Creek *E. coli* Existing Annual Loading

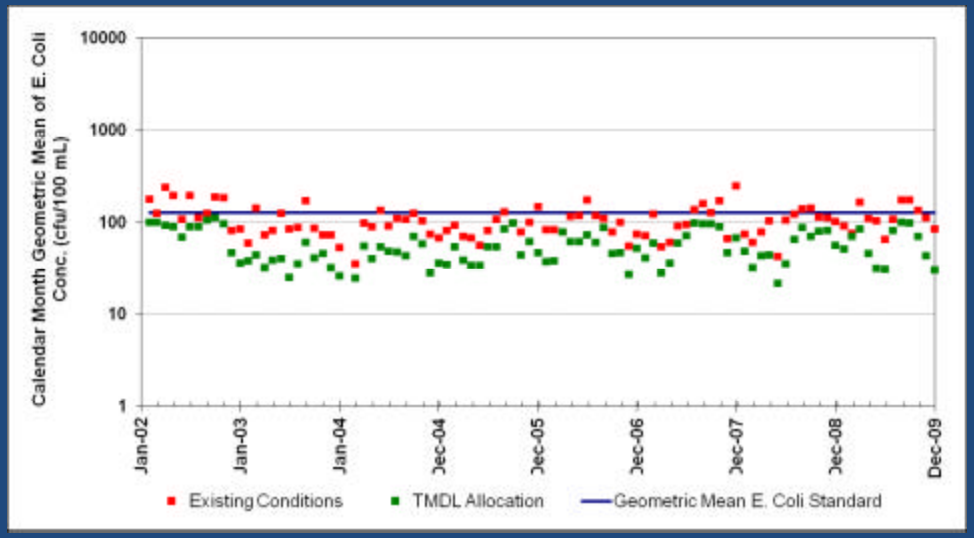


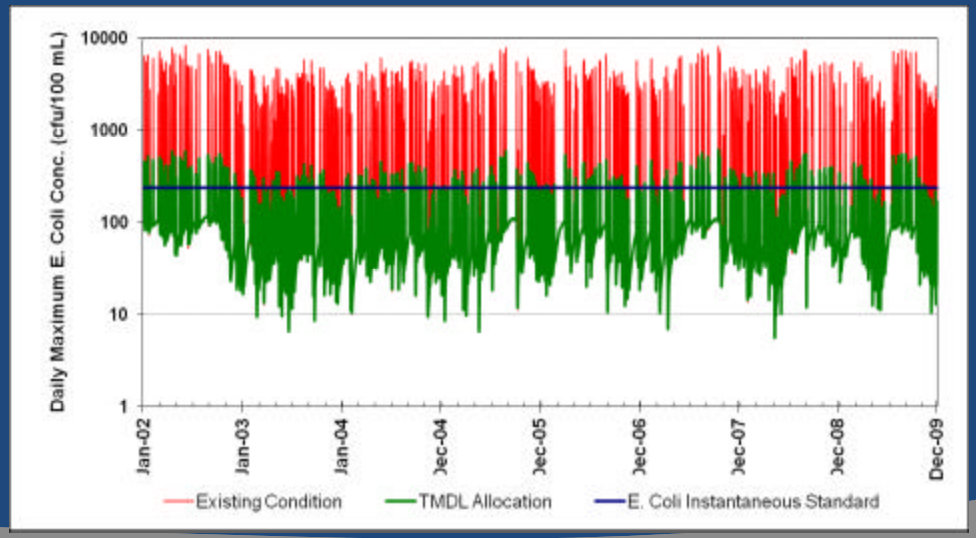

| Source | Annual Average *E. coli* Existing Loads | |
|---|---|---|
| | cfu/yr | % |
| Forest | 2.60E+13 | 90.5% |
| Cropland | 1.98E+09 | 0.0% |
| Pasture | 4.15E+08 | 0.0% |
| Urban | 5.93E+11 | 2.1% |
| Cattle Direct Deposition | 0.00E+00 | 0.0% |
| Wildlife Direct Deposition | 2.12E+12 | 7.4% |
| Failing Septics | 0.00E+00 | 0.0% |
| Point Sources | 0.00E+00 | 0.0% |
| **Total** | **2.87E+13** | **100.0%** |

# North Branch Chopawamsic Creek Scenarios

| Scenario | Failing Sewage Disposal Systems | Direct Deposition from Cattle | Non-Point Source Agriculture | Non-Point Source Urban | Non-Point Source Forest (Wildlife) | Direct Deposition from Wildlife | Percent Exceedance of the *E. Coli* Geometric Mean Criterion | Percent Exceedance of the *E. Coli* Maximum Assessment Criterion |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | 25% | 29% |
| 1 | 100 | | | | | | 25% | 29% |
| 2 | 100 | 50 | | | | | 25% | 29% |
| 3 | 100 | 100 | | | | | 25% | 29% |
| 4 | 100 | 100 | 100 | 100 | | | 23% | 27% |
| 5 | 100 | 100 | | | | 50 | 4% | 27% |
| 6 | 100 | 100 | | | | 75 | 1% | 27% |
| 7 | 100 | 100 | 95 | 95 | 95 | 0 | 0% | 9% |
| 8 | 100 | 100 | 85 | 85 | 85 | 0 | 2% | 12% |
| 9 | 100 | 100 | 90 | 90 | 90 | 0 | 0% | 12% |
| 10 | 100 | 50 | 50 | 50 | 50 | 0 | 6% | 17% |
| 11 | 100 | 75 | 75 | 75 | 75 | 0 | 4% | 15% |
| 12 | 100 | 100 | | | | 100 | 0% | 19% |
| **13** | **100** | **100** | **93.6** | **93.6** | **93.6** | **0** | **0%** | **10%** |

# DRAFT North Branch Chopawamsic Creek TMDL Allocation

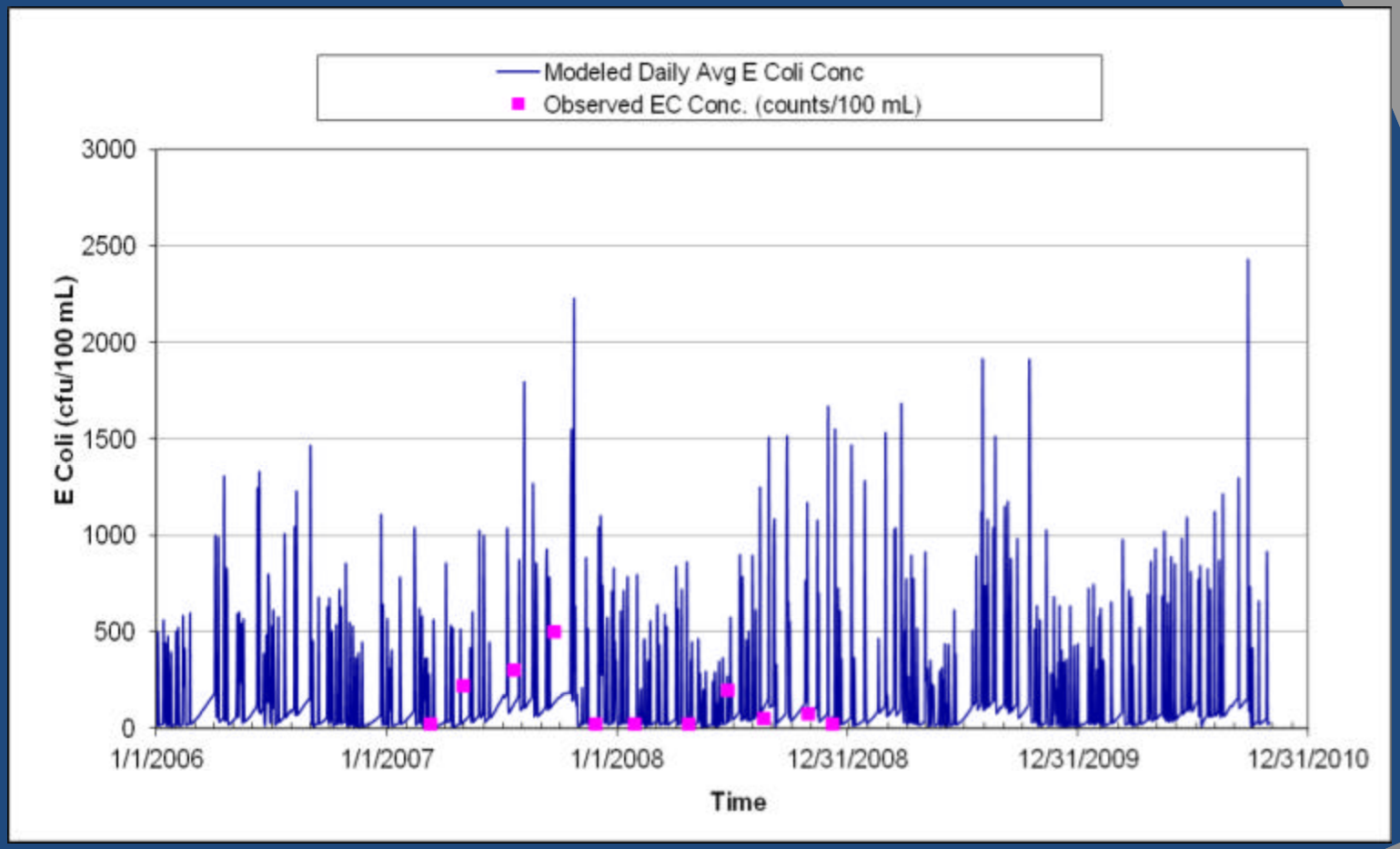



| Land Use/Source | Annual Average *E. coli* Loads (cfu/yr) | | Reduction (%) |
|---|---|---|---|
| | Existing | Allocation | |
| Forest | 2.60E+13 | 1.66E+12 | 93.6% |
| Cropland | 1.98E+09 | 1.26E+08 | 93.6% |
| Pasture | 4.15E+08 | 2.65E+07 | 93.6% |
| Urban | 5.93E+11 | 3.79E+10 | 93.6% |
| Cattle - direct deposition | 0.00E+00 | 0.00E+00 | 0.0% |
| Wildlife - direct deposition | 2.12E+12 | 2.12E+12 | 0.0% |
| Failing Septic - direct deposition | 0.00E+00 | 0.00E+00 | 0.0% |
| Permitted Point Sources* | 0.00E+00 | 3.82E+10 | - |

**Draft allocation for Permitted Point Sources includes an allowance for the future growth and expansion of point sources in the watershed.*

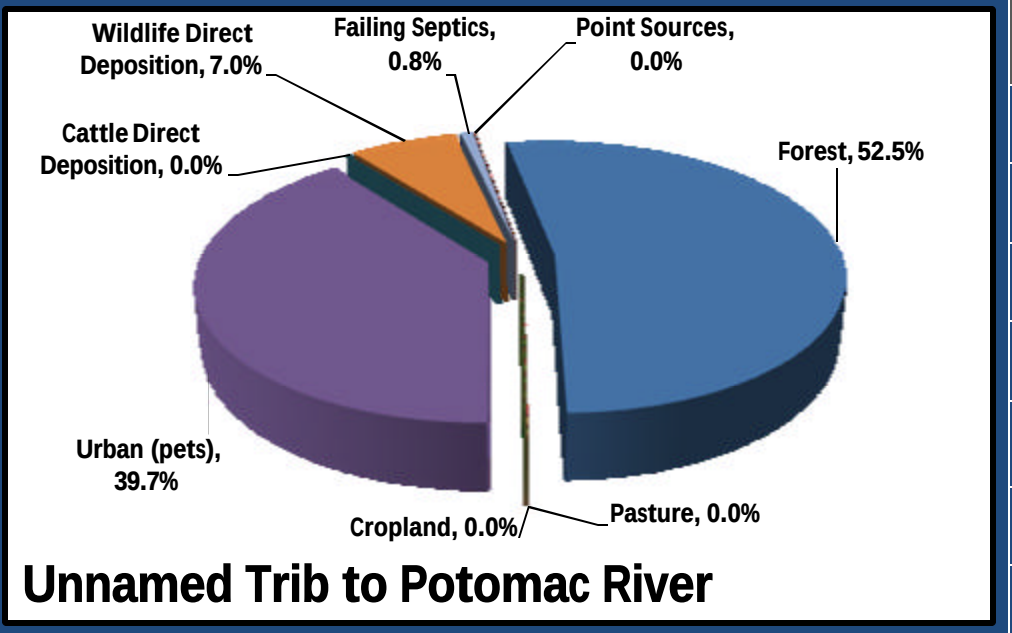
# WQ Calibration – Unnamed Tributary to Potomac River (1AXLF000.13)




| *E. coli* Geometric Mean | |
|---|---|
| Simulated | Observed |
| 68 | 71 |

| Percent Exceedance of the *E. coli* Maximum Assessment Criterion | |
|---|---|
| Simulated | Observed |
| 25 | 18 |

# DRAFT Unnamed Tributary to Potomac River *E. coli* Existing Annual Loading

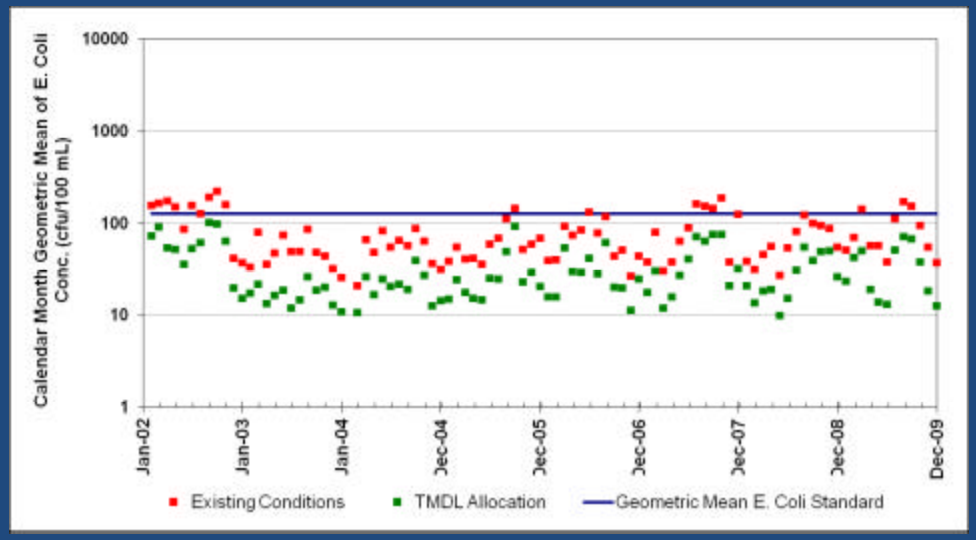


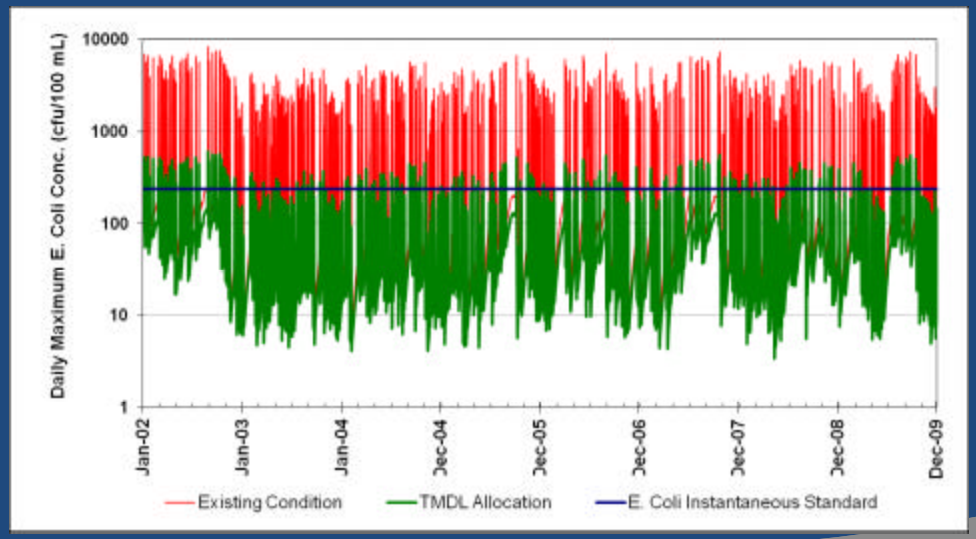

| Source | Annual Average *E. coli* Existing Loads | |
|---|---|---|
| | cfu/yr | % |
| Forest | 5.17E+12 | 52.5% |
| Cropland | 1.70E+09 | 0.0% |
| Pasture | 1.07E+09 | 0.0% |
| Urban | 3.90E+12 | 39.7% |
| Cattle Direct Deposition | 1.08E+09 | 0.0% |
| Wildlife Direct Deposition | 6.90E+11 | 7.0% |
| Failing Septics | 7.45E+10 | 0.8% |
| Point Sources | 1.74E+09 | 0.0% |
| **Total** | **9.85E+12** | **100.0%** |

# Unnamed Tributary to Potomac Creek Scenarios

| Scenario | Failing Sewage Disposal Systems | Direct Deposition from Cattle | Non-Point Source Agriculture | Non-Point Source Urban | Non-Point Source Forest (Wildlife) | Direct Deposition from Wildlife | Percent Exceedance of the *E. Coli* Geometric Mean Criterion | Percent Exceedance of the *E. Coli* Maximum Assessment Criterion |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | 19% | 25% |
| 1 | 100 | | | | | | 18% | 24% |
| 2 | 100 | 50 | | | | | 18% | 24% |
| 3 | 100 | 100 | | | | | 16% | 24% |
| 4 | 100 | 100 | 100 | 100 | | | 6% | 17% |
| 5 | 100 | 100 | | | | 50 | 0% | 21% |
| 6 | 100 | 100 | | | | 75 | 0% | 20% |
| 7 | 100 | 100 | 95 | 95 | 95 | 0 | 0% | 9% |
| 8 | 100 | 100 | 85 | 85 | 85 | 0 | 0% | 13% |
| 9 | 100 | 100 | 90 | 90 | 90 | 0 | 0% | 12% |
| 10 | 100 | 50 | 50 | 50 | 50 | 0 | 3% | 19% |
| 11 | 100 | 75 | 75 | 75 | 75 | 0 | 1% | 17% |
| 12 | 100 | 100 | | | | 100 | 0% | 19% |
| **13** | **100** | **100** | **94.4** | **94.4** | **94.4** | **0** | **0%** | **10%** |

# DRAFT Unnamed Tributary to Potomac River TMDL Allocation

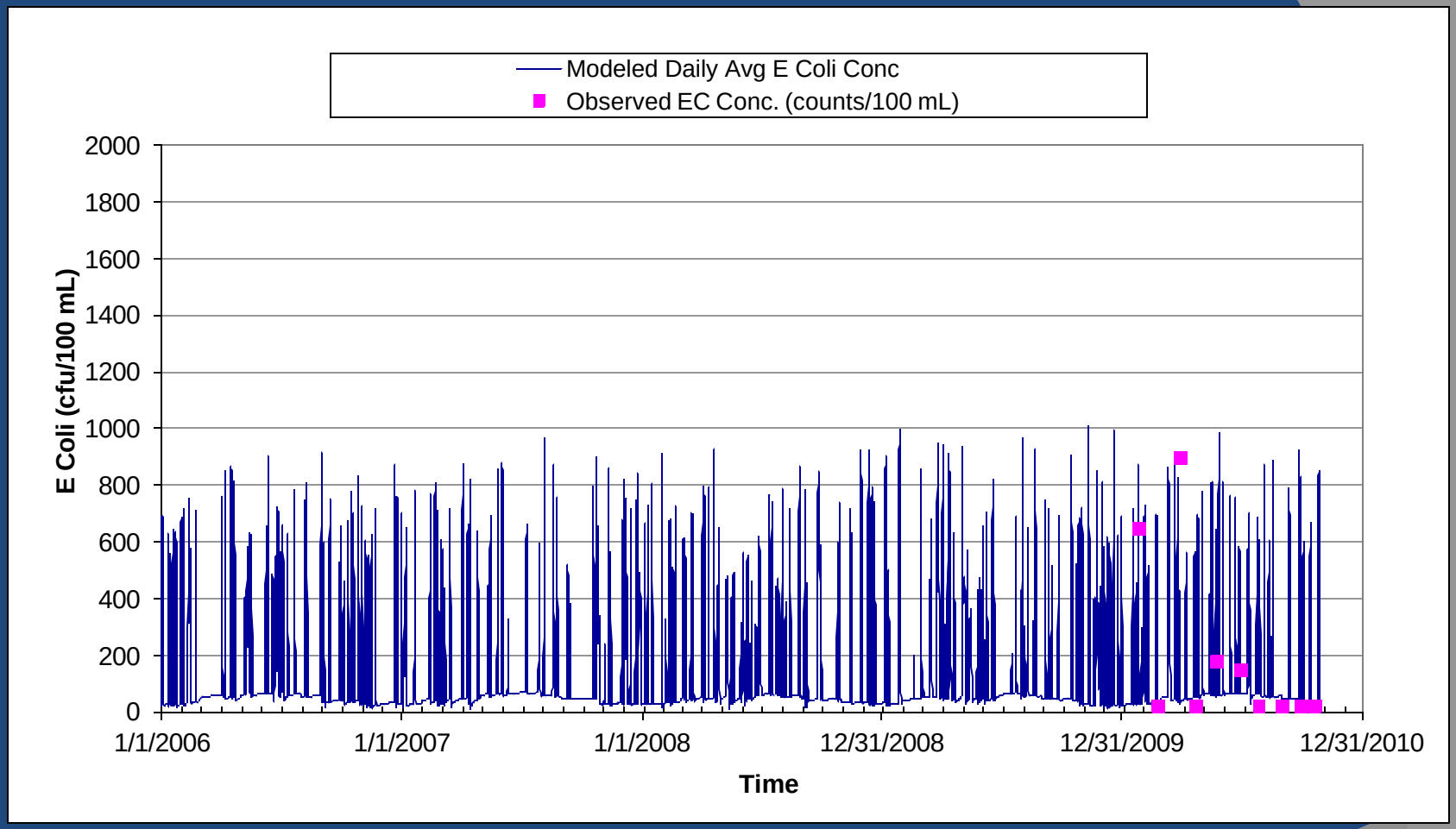



| Land Use/Source | Annual Average *E. coli* Loads (cfu/yr) | | Reduction (%) |
|---|---|---|---|
| | Existing | Allocation | |
| Forest | 5.17E+12 | 2.90E+11 | 94.4% |
| Cropland | 1.70E+09 | 9.50E+07 | 94.4% |
| Pasture | 1.07E+09 | 5.98E+07 | 94.4% |
| Urban | 3.90E+12 | 2.19E+11 | 94.4% |
| Cattle - direct deposition | 1.08E+09 | 0.00E+00 | 100.0% |
| Wildlife - direct deposition | 6.90E+11 | 6.90E+11 | 0.0% |
| Failing Septic - direct deposition | 7.45E+10 | 0.00E+00 | 100.0% |
| Permitted Point Sources* | 1.74E+09 | 1.37E+10 | - |

**Draft allocation for Permitted Point Sources includes an allowance for the future growth and expansion of point sources in the watershed.*

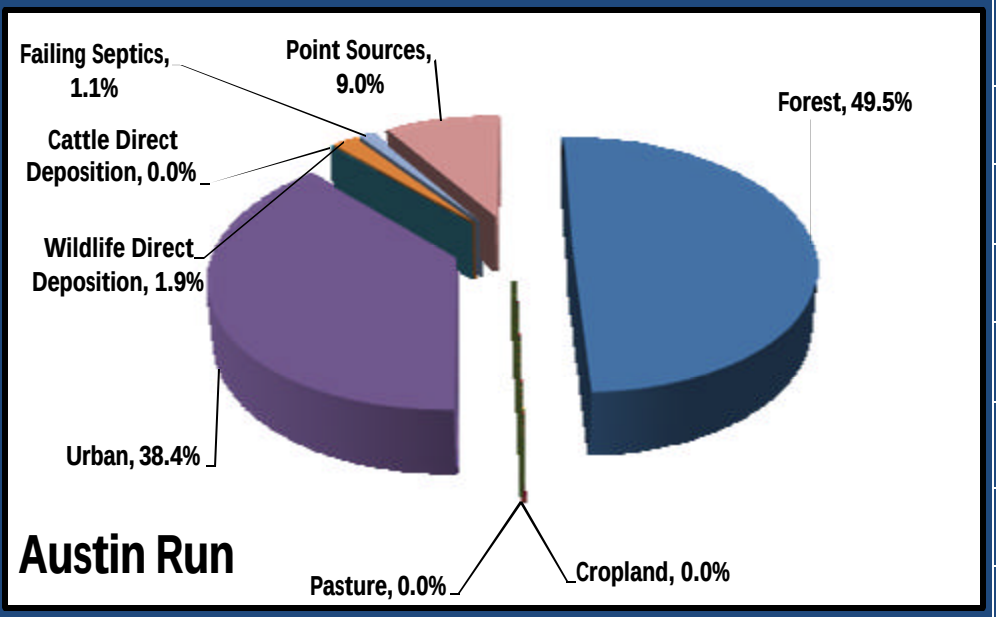
# WQ Calibration – Austin Run (1AAUS000.49)




| *E. coli* Geometric Mean | |
|---|---|
| Simulated | Observed |
| 72 | 72 |

| Percent Exceedance of the *E. coli* Maximum Assessment Criterion | |
|---|---|
| Simulated | Observed |
| 23 | 20 |

# DRAFT Austin Run *E. coli* Existing Annual Loading



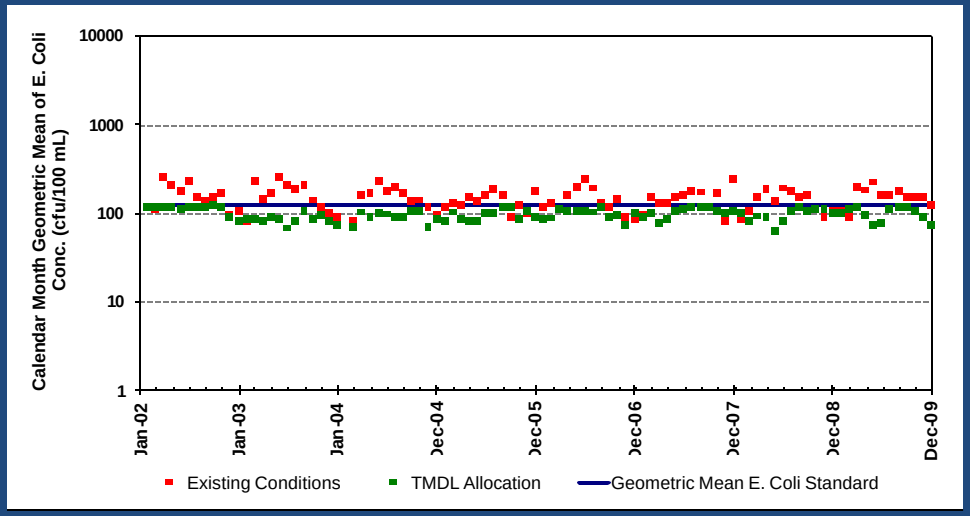

| Source | Annual Average *E. coli* Existing Loads | |
|---|---|---|
| | cfu/yr | % |
| Forest | 4.33E+13 | 49.5% |
| Cropland | 7.42E+09 | 0.0% |
| Pasture | 2.88E+09 | 0.0% |
| Urban | 3.36E+13 | 38.4% |
| Cattle Direct Deposition | 2.48E+10 | 0.0% |
| Wildlife Direct Deposition | 1.67E+12 | 1.9% |
| Failing Septics | 9.62E+11 | 1.1% |
| Point Sources* | 7.87E+12 | 9.0% |
| **Total** | **8.74E+13** | **100.0%** |

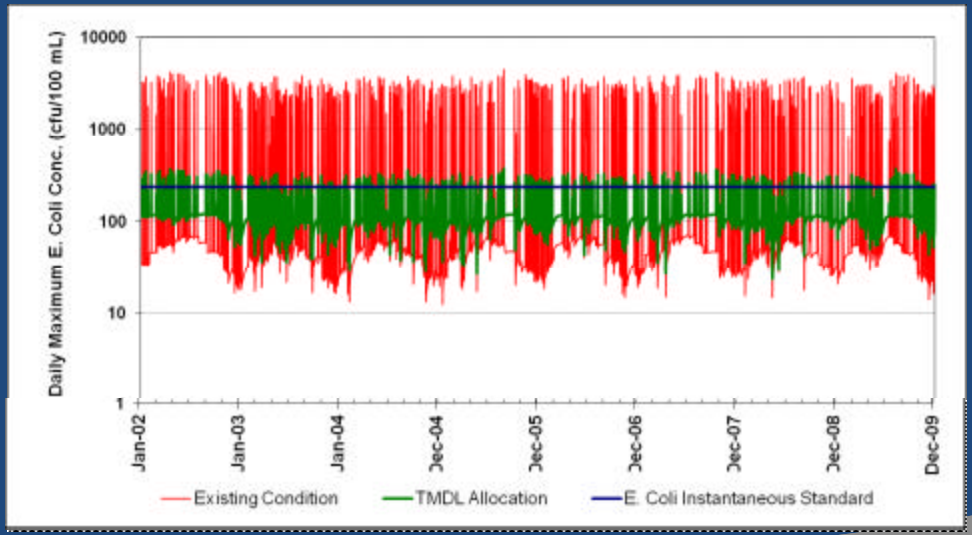
* Average reported discharge flow of 4.52 MDG used for Aquia Wastewater Treatment Plant during the water quality calibration and the development of the existing conditions E. coli loads

# Austin Run Scenarios

| Scenario | Failing Sewage Disposal Systems | Direct Deposition from Cattle | Non-Point Source Agriculture | Non-Point Source Urban | Non-Point Source Forest (Wildlife) | Direct Deposition from Wildlife | Percent Exceedance of the *E. Coli* Geometric Mean Criterion | Percent Exceedance of the *E. Coli* Maximum Assessment Criterion |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | 98% | 25% |
| 1 | 100 | | | | | | 98% | 25% |
| 2 | 100 | 50 | | | | | 98% | 25% |
| 3 | 100 | 100 | | | | | 98% | 25% |
| 4 | 100 | 100 | 100 | 100 | | | 10% | 19% |
| 5 | 100 | 100 | | | | 50 | 65% | 24% |
| 6 | 100 | 100 | | | | 75 | 61% | 24% |
| 7 | 100 | 100 | 85 | 85 | 85 | 0 | 8% | 19% |
| 8 | 100 | 100 | 90 | 90 | 90 | 0 | 7% | 17% |
| 9 | 100 | 50 | 50 | 50 | 50 | 0 | 12% | 21% |
| 10 | 100 | 75 | 75 | 75 | 75 | 0 | 10% | 22% |
| 11 | 100 | 100 | 95 | 95 | 95 | 0 | 0% | 11% |
| **12** | **100** | **100** | **95.9** | **95.9** | **95.9** | **0** | **0%** | **10%** |

# DRAFT Austin Run TMDL Allocation

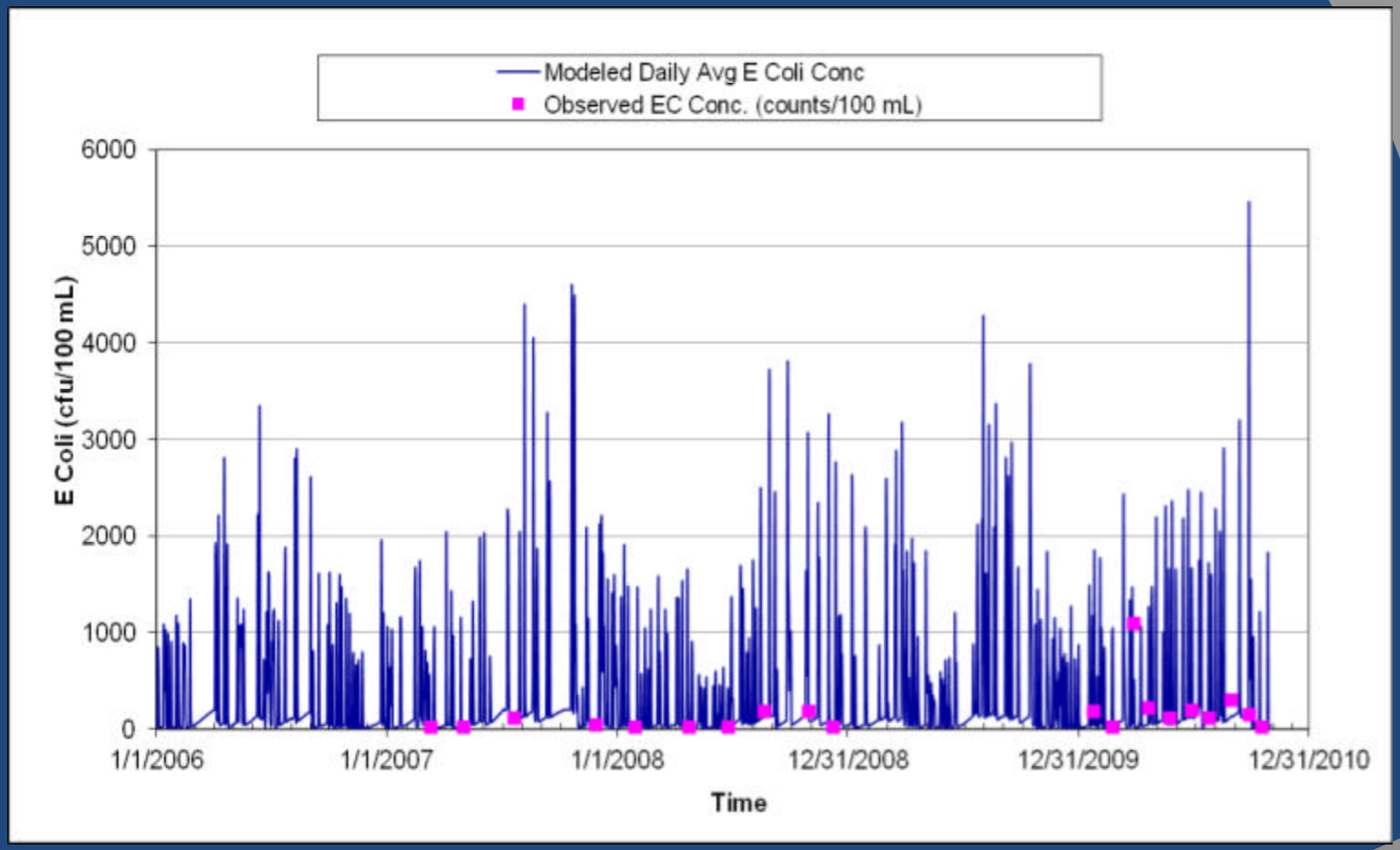



| Land Use/Source | Annual Average *E. coli* Loads (cfu/yr) | | Reduction (%) |
|---|---|---|---|
| | Existing | Allocation | |
| Forest | 4.33E+13 | 1.78E+12 | 95.9% |
| Cropland | 7.42E+09 | 3.04E+08 | 95.9% |
| Pasture | 2.88E+09 | 1.18E+08 | 95.9% |
| Urban | 3.36E+13 | 1.38E+12 | 95.9% |
| Cattle - direct deposition | 2.48E+10 | 0.00E+00 | 100.0% |
| Wildlife - direct deposition | 1.67E+12 | 1.67E+12 | 0.0% |
| Failing Septic - direct deposition | 9.62E+11 | 0.00E+00 | 100.0% |
| Permitted Point Sources* | 7.87E+12 | 2.12E+13 | - |

**Draft allocation for Permitted Point Sources includes an allowance for the future growth and expansion of point sources in the watershed.*

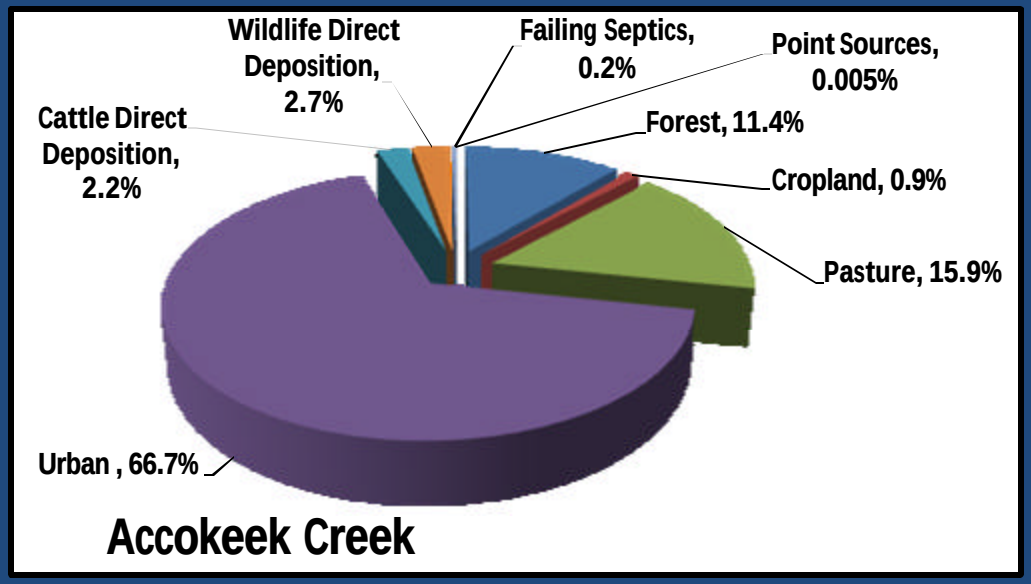
# WQ Calibration – Accokeek Creek (1AACC006.13)




| *E. coli* Geometric Mean | |
|---|---|
| Simulated | Observed |
| 102 | 104 |

| Percent Exceedance of the *E. coli* Maximum Assessment Criterion | |
|---|---|
| Simulated | Observed |
| 31 | 18 |

# DRAFT Accokeek Creek *E. coli* Existing Annual Loading

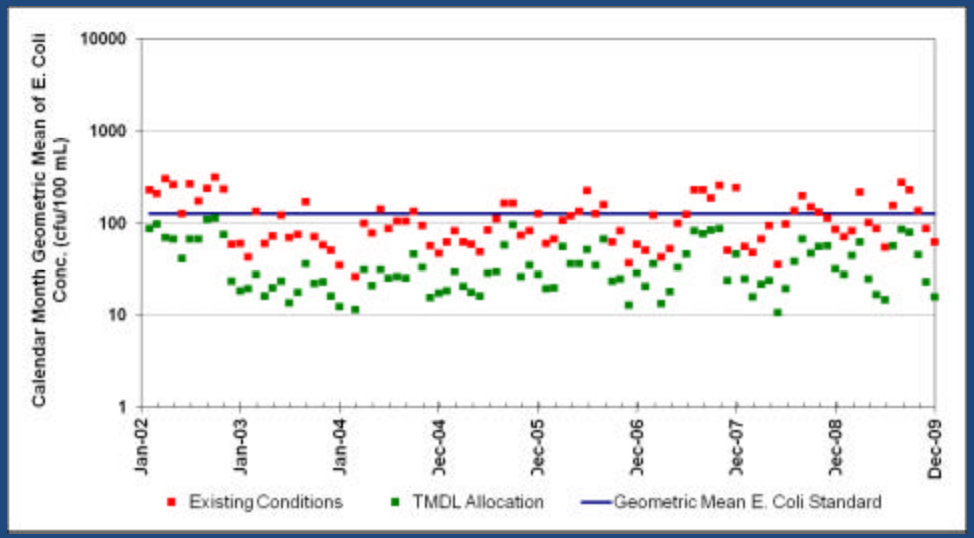


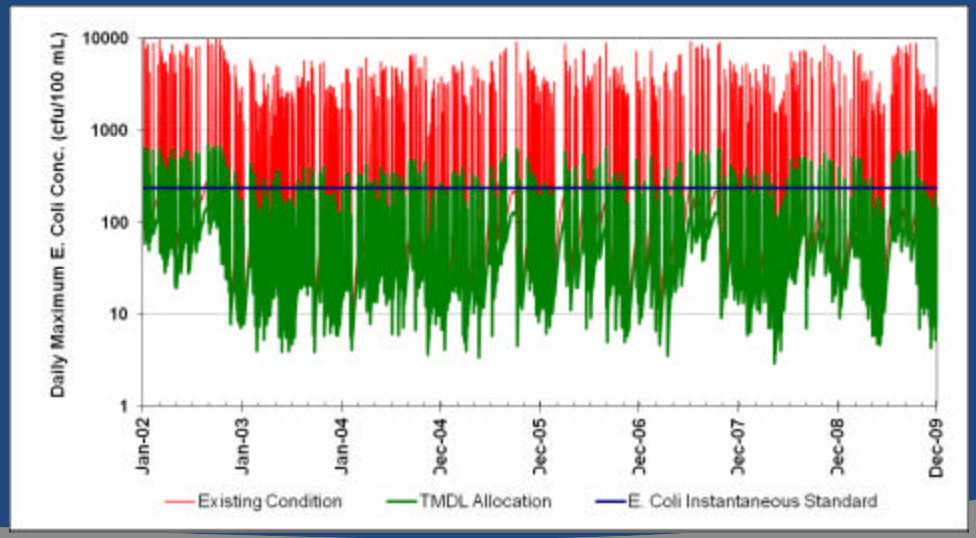

| Source | Annual Average *E. coli* Existing Loads | |
|---|---|---|
| | cfu/yr | % |
| Forest | 7.24E+12 | 11.4% |
| Cropland | 5.52E+11 | 0.9% |
| Pasture | 1.01E+13 | 15.9% |
| Urban | 4.24E+13 | 66.7% |
| Cattle Direct Deposition | 1.40E+12 | 2.2% |
| Wildlife Direct Deposition | 1.73E+12 | 2.7% |
| Failing Septics | 1.33E+11 | 0.2% |
| Point Sources | 3.13E+09 | 0.0% |
| Total | 6.35E+13 | 100.0% |

# Accokeek Creek Scenarios

| Scenario | Failing Sewage Disposal Systems | Direct Deposition from Cattle | Non-Point Source Agriculture | Non-Point Source Urban | Non-Point Source Forest (Wildlife) | Direct Deposition from Wildlife | Percent Exceedance of the *E. Coli* Geometric Mean Criterion | Percent Exceedance of the *E. Coli* Maximum Assessment Criterion |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | 38% | 31% |
| 1 | 100 | | | | | | 33% | 31% |
| 2 | 100 | 50 | | | | | 25% | 30% |
| 3 | 100 | 100 | | | | | 18% | 30% |
| 4 | 100 | 100 | 100 | 100 | | | 1% | 23% |
| 5 | 100 | 100 | | | | 50 | 4% | 21% |
| 6 | 100 | 100 | | | | 75 | 2% | 21% |
| 7 | 100 | 100 | 95 | 95 | 95 | 0 | 0% | 11% |
| 8 | 100 | 100 | 85 | 85 | 85 | 0 | 1% | 15% |
| 9 | 100 | 100 | 90 | 90 | 90 | 0 | 1% | 13% |
| 10 | 100 | 50 | 50 | 50 | 50 | 0 | 17% | 22% |
| 11 | 100 | 75 | 75 | 75 | 75 | 0 | 7% | 19% |
| 12 | 100 | 100 | | | | 100 | 0% | 18% |
| **13** | **100** | **100** | **95.5** | **95.5** | **65.5** | **0** | **0%** | **10%** |

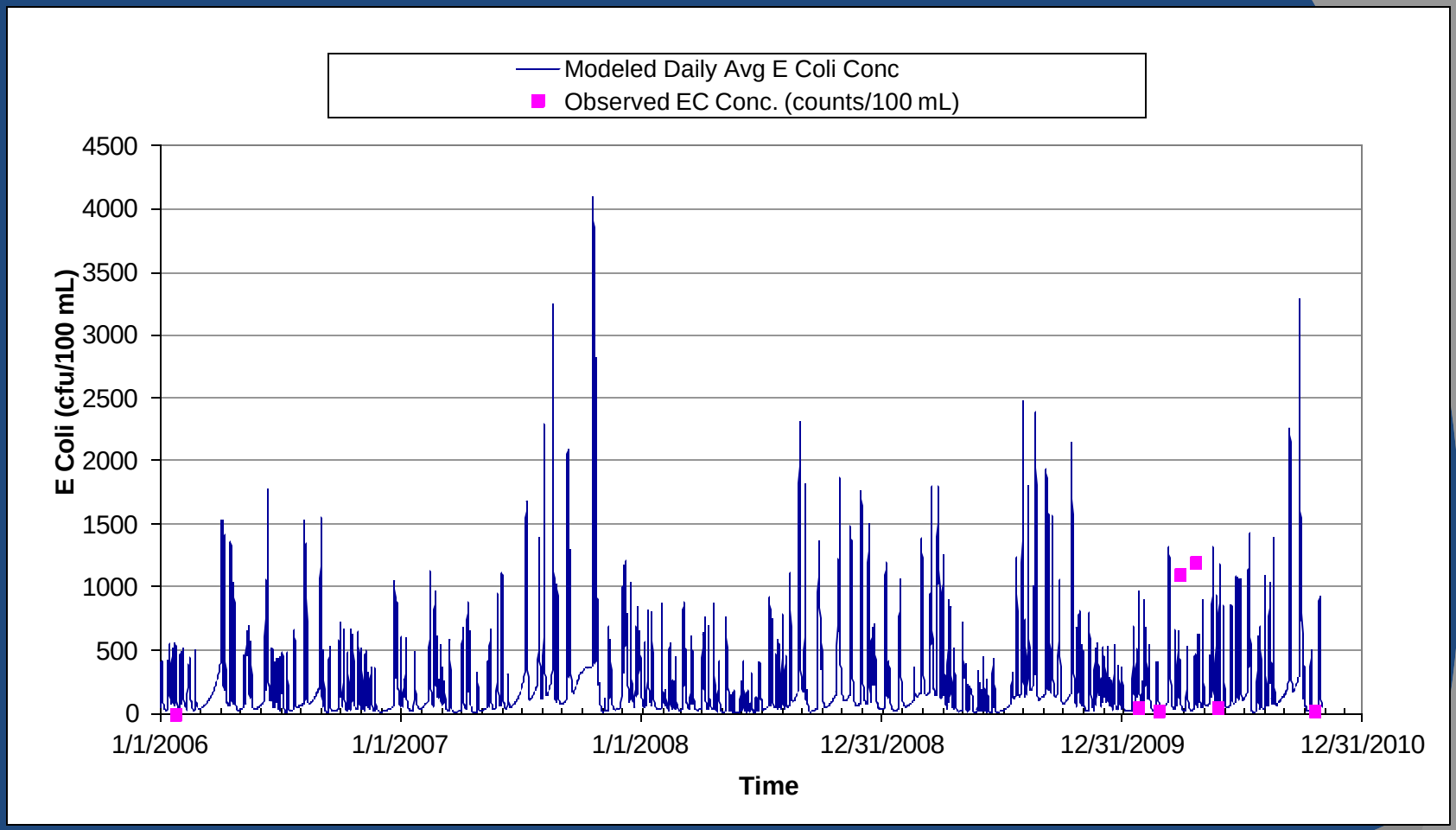
# DRAFT Accokeek Creek TMDL Allocation




| Land Use/Source | Annual Average *E. coli* Loads (cfu/yr) | | Reduction (%) |
|---|---|---|---|
| | Existing | Allocation | |
| Forest | 7.24E+12 | 2.50E+12 | 65.5% |
| Cropland | 5.52E+11 | 2.49E+10 | 95.5% |
| Pasture | 1.01E+13 | 4.53E+11 | 95.5% |
| Urban | 4.24E+13 | 1.91E+12 | 95.5% |
| Cattle - direct deposition | 1.40E+12 | 0.00E+00 | 100.0% |
| Wildlife - direct deposition | 1.73E+12 | 1.73E+12 | 0.0% |
| Failing Septic - direct deposition | 1.33E+11 | 0.00E+00 | 100.0% |
| Permitted Point Sources* | 3.13E+09 | 6.93E+10 | - |

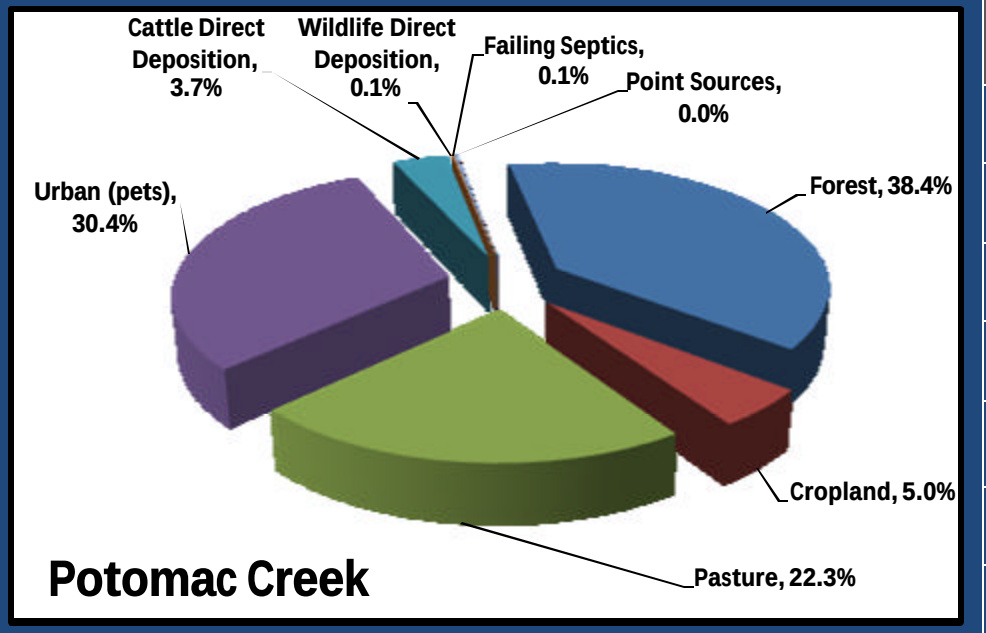
# WQ Calibration – Potomac Creek (1APOM006.72)




| *E. coli* Geometric Mean | |
|---|---|
| Simulated | Observed |
| 105 | 101 |

| Percent Exceedance of the *E. coli* Maximum Assessment Criterion | |
|---|---|
| Simulated | Observed |
| 35 | 32 |

# DRAFT Potomac Creek *E. coli* Existing Annual Loading

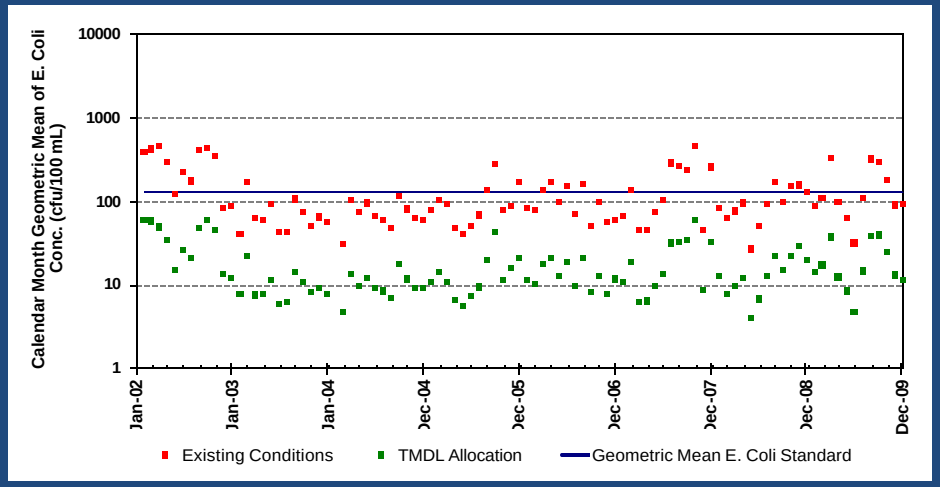


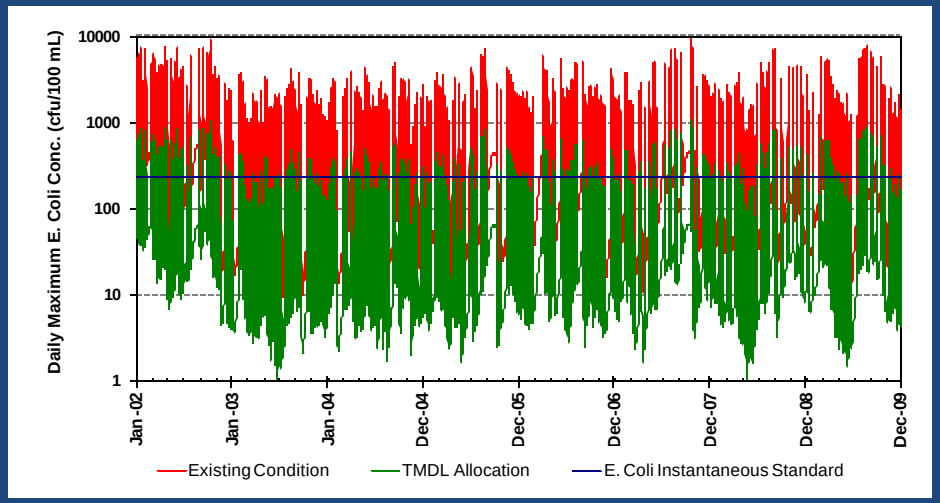

| Source | Annual Average *E. coli* Existing Loads | |
|---|---|---|
| | cfu/yr | % |
| Forest | 5.61E+13 | 38.4% |
| Cropland | 7.27E+12 | 5.0% |
| Pasture | 3.26E+13 | 22.3% |
| Urban | 4.44E+13 | 30.4% |
| Cattle Direct Deposition | 5.37E+12 | 3.7% |
| Wildlife Direct Deposition | 1.21E+11 | 0.1% |
| Failing Septics | 2.18E+11 | 0.1% |
| Point Sources | 0.00E+00 | 0.0% |
| **Total** | **1.46E+14** | **100.0%** |

# Potomac Creek Scenarios

| Scenario | Failing Sewage Disposal Systems | Direct Deposition from Cattle | Non-Point Source Agriculture | Non-Point Source Urban | Non-Point Source Forest (Wildlife) | Direct Deposition from Wildlife | Percent Exceedance of the *E. Coli* Geometric Mean Criterion | Percent Exceedance of the *E. Coli* Maximum Assessment Criterion |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | 32% | 34% |
| 1 | 100 | | | | | | 32% | 34% |
| 2 | 100 | 50 | | | | | 28% | 32% |
| 3 | 100 | 100 | | | | | 17% | 29% |
| 4 | 100 | 100 | 100 | 100 | | | 5% | 14% |
| 5 | 100 | 100 | | | | 50 | 5% | 27% |
| 6 | 100 | 100 | | | | 75 | 5% | 27% |
| 7 | 100 | 100 | 95 | 95 | 95 | 0 | 0% | 4% |
| 8 | 100 | 100 | 85 | 85 | 85 | 0 | 0% | 16% |
| 9 | 100 | 100 | 90 | 90 | 90 | 0 | 0% | 12% |
| 10 | 100 | 50 | 50 | 50 | 50 | 0 | 15% | 25% |
| 11 | 100 | 75 | 75 | 75 | 75 | 0 | 5% | 19% |
| 12 | 100 | 100 | | | | 100 | 4% | 27% |
| **13** | **100** | **100** | **92.2** | **92.2** | **92.2** | **0** | **0%** | **10%** |

# DRAFT Potomac Creek TMDL Allocation

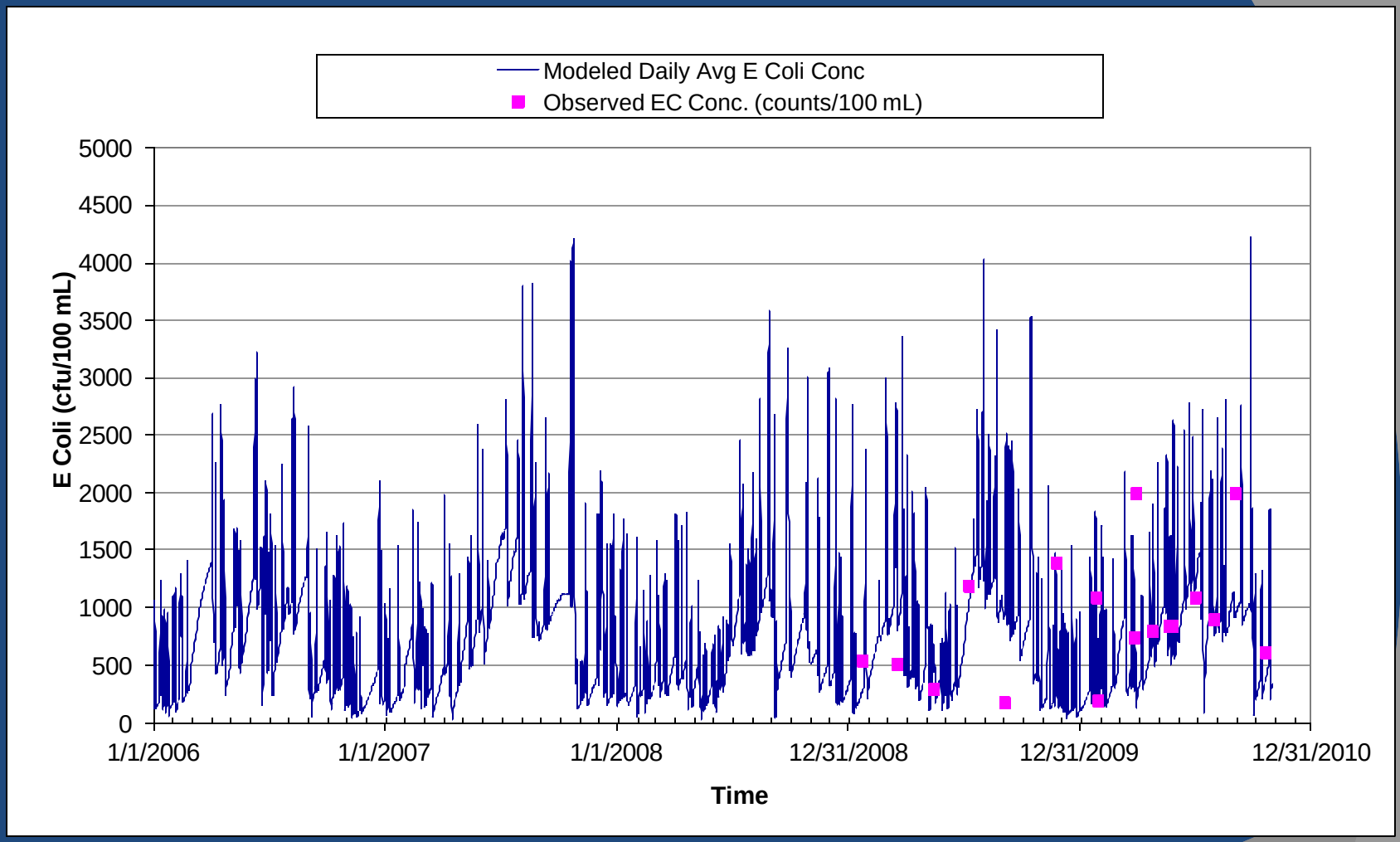



| Land Use/Source | Annual Average *E. coli* Loads (cfu/yr) | | Reduction (%) |
|---|---|---|---|
| | Existing | Allocation | |
| Forest | 5.61E+13 | 4.37E+12 | 92.2% |
| Cropland | 7.27E+12 | 5.67E+11 | 92.2% |
| Pasture | 3.26E+13 | 2.54E+12 | 92.2% |
| Urban | 4.44E+13 | 3.46E+12 | 92.2% |
| Cattle - direct deposition | 5.37E+12 | 0.00E+00 | 100.0% |
| Wildlife - direct deposition | 1.21E+11 | 1.21E+11 | 0.0% |
| Failing Septic - direct deposition | 2.18E+11 | 0.00E+00 | 100.0% |
| Permitted Point Sources* | 0.00E+00 | 1.11+11 | 0.0% |

**Draft allocation for Permitted Point Sources includes an allowance for the future growth and expansion of point sources in the watershed.*

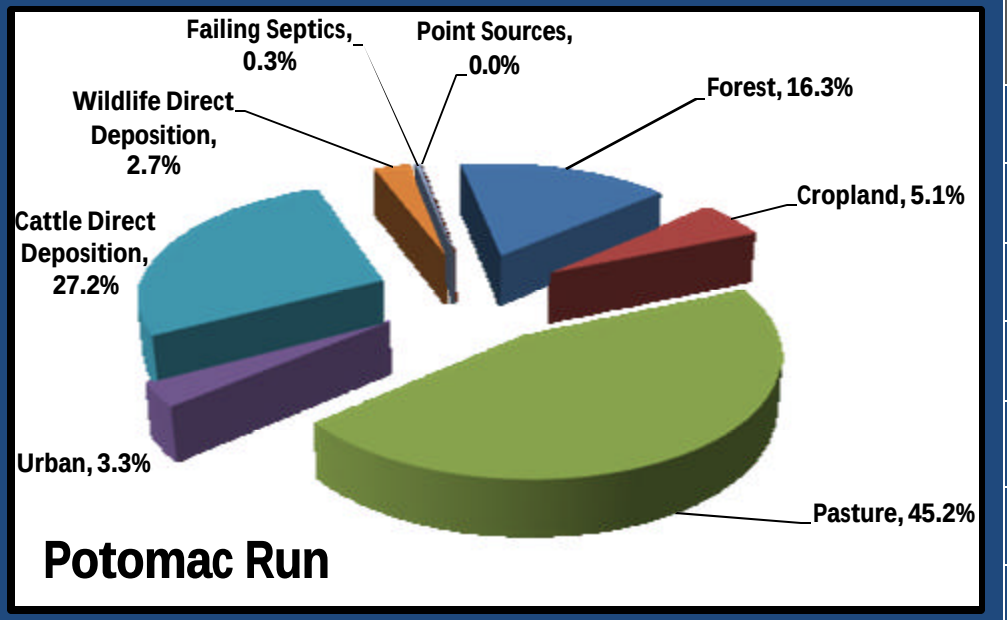
# WQ Calibration – Potomac Run (1APOR000.40)




| *E. coli* Geometric Mean | |
|---|---|
| Simulated | Observed |
| 548 | 621 |

| Percent Exceedance of the *E. coli* Maximum Assessment Criterion | |
|---|---|
| Simulated | Observed |
| 84 | 83 |

# DRAFT Potomac Run *E. coli* Existing Annual Loading

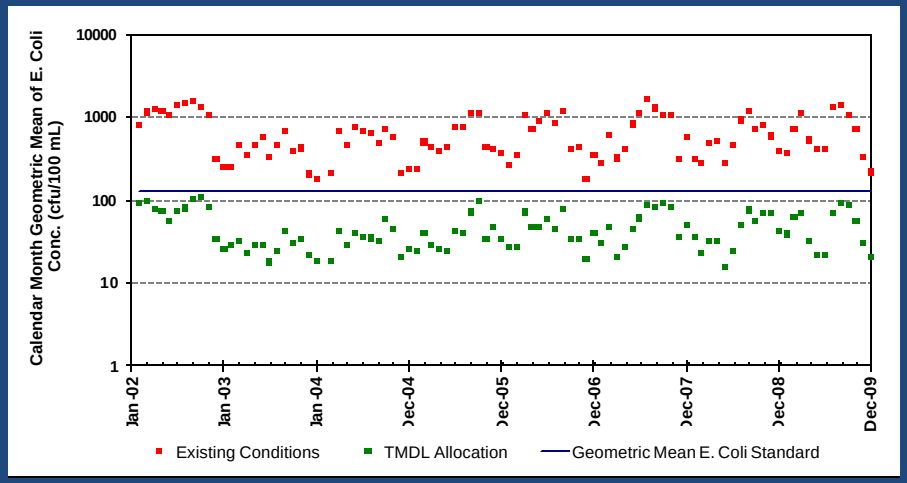


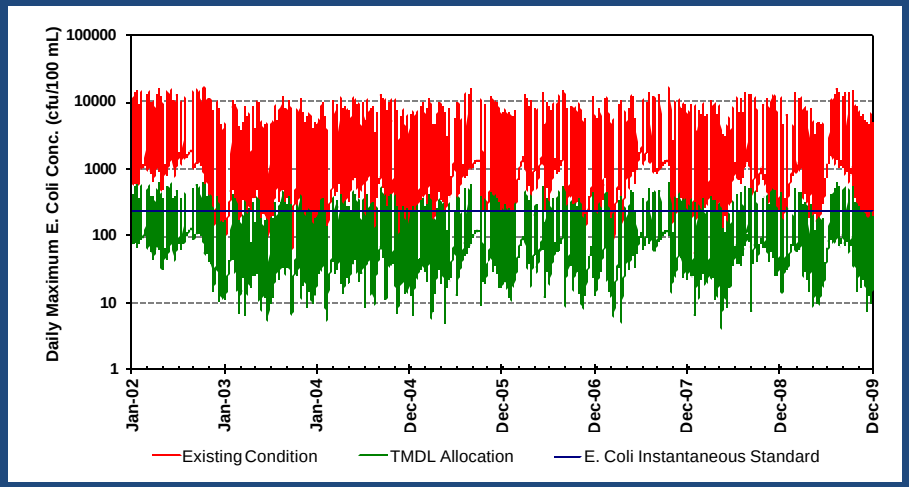

| Source | Annual Average *E. coli* Existing Loads | |
|---|---|---|
| | cfu/yr | % |
| Forest | 1.31E+13 | 16.3% |
| Cropland | 4.14E+12 | 5.1% |
| Pasture | 3.64E+13 | 45.2% |
| Urban | 2.63E+12 | 3.3% |
| Cattle Direct Deposition | 2.19E+13 | 27.2% |
| Wildlife Direct Deposition | 2.17E+12 | 2.7% |
| Failing Septics | 2.16E+11 | 0.3% |
| Point Sources | 0.00E+00 | 0.0% |
| **Total** | **8.05E+13** | **100.0%** |

# Potomac Run Scenarios

| Scenario | Failing Sewage Disposal Systems | Direct Deposition from Cattle | Non-Point Source Agriculture | Non-Point Source Urban | Non-Point Source Forest (Wildlife) | Direct Deposition from Wildlife | Percent Exceedance of the *E. Coli* Geometric Mean Criterion | Percent Exceedance of the *E. Coli* Maximum Assessment Criterion |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | 100% | 85% |
| 1 | 100 | | | | | | 100% | 85% |
| 2 | 100 | 50 | | | | | 97% | 77% |
| 3 | 100 | 100 | | | | | 15% | 34% |
| 4 | 100 | 100 | 100 | 100 | | | 7% | 20% |
| 5 | 100 | 100 | | | | 50 | 2% | 25% |
| 6 | 100 | 100 | | | | 75 | 0% | 25% |
| 7 | 100 | 100 | 95 | 95 | 95 | 0 | 5% | 18% |
| 8 | 100 | 100 | 85 | 85 | 85 | 0 | 7% | 21% |
| 9 | 100 | 100 | 90 | 90 | 90 | 0 | 8% | 21% |
| 10 | 100 | 50 | 50 | 50 | 50 | 0 | 36% | 43% |
| 11 | 100 | 75 | 75 | 75 | 75 | 0 | 22% | 34% |
| 12 | 100 | 100 | | | | 100 | 0% | 24% |
| 13 | 100 | 100 | 98.0 | 98.0 | 98.0 | 59.0 | 0% | 10% |

# DRAFT Potomac Run TMDL Allocation




| Land Use/Source | Annual Average *E. coli* Loads (cfu/yr) | | Reduction (%) |
|---|---|---|---|
| | Existing | Allocation | |
| Forest | 1.31E+13 | 2.62E+11 | 98.0% |
| Cropland | 4.14E+12 | 8.28E+10 | 98.0% |
| Pasture | 3.64E+13 | 7.28E+11 | 98.0% |
| Urban | 2.63E+12 | 5.26E+10 | 98.0% |
| Cattle - direct deposition | 2.19E+13 | 0.00E+00 | 100.0% |
| Wildlife - direct deposition | 2.17E+12 | 8.88E+11 | 59.0% |
| Failing Septic - direct deposition | 2.16E+11 | 0.00E+00 | 100.0% |
| Permitted Point Sources* | 0.00E+00 | 2.01E+10 | 0.0% |

**Draft allocation for Permitted Point Sources includes an allowance for the future growth and expansion of point sources in the watershed.*

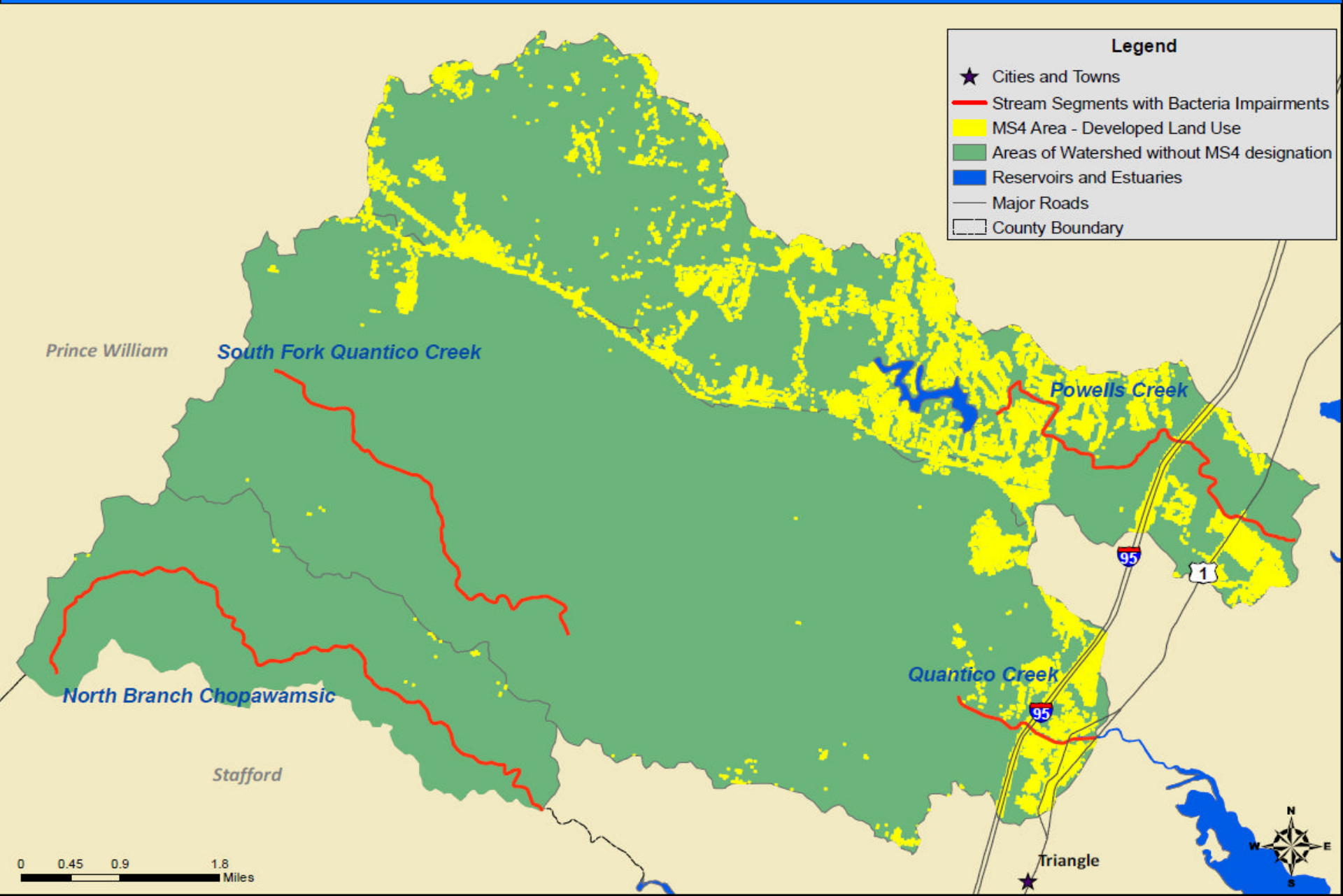
# MS4 Allocations

- For this project, to be defined as an MS4 area the following criteria must be met:
  - **Phase I MS4 Permit:** Area must be within the geographical bounds of the Permit Area (for example, if the permit is for Prince William County, must be within the bounds of Prince William County) and have land use defined as high, medium, or low density developed area.
  - **Phase II MS4 Permit**: Area must be within the geographical bounds of the Permit Area (for example, if the permit is for Stafford County, must be within the bounds of Stafford County); have land use defined as high, medium, or low density developed area; and be located within the Census defined Urban Areas (last Census update – 2008).
- The assumption is that the areas that fit the above criteria are roughly equivalent to the areas that drain to MS4 outfalls.
- Best approach at this time to estimate what areas drain to MS4 outfalls. If, in the future, permittees can provide better information regarding their system outfalls and drainage areas, report can be updated at a later date.
- Loadings will be lumped together by geographical jurisdiction.

# DRAFT MS4 Allocations

| Permit Number | MS4 Permit | MS4 Geographical Area | Developed Acreage | Overall MS4 Allocation (cfu/year) | Allocation Unit Load (cfu/acre/year) | MS4 Allocation by Jurisdiction (cfu/year) |
|---|---|---|---|---|---|---|
| **Powells Creek (A26R-02-BAC)** | | | | | | |
| VA0088595 | Prince William County | Prince William County | 2,242.0 | 2.30E+12 | 1.03E+09 | 2.30E+12 |
| VAR040100 | Prince William County Public Schools | | | | | |
| VAR040115 | Virginia Department of Transportation | | | | | |
| | | **Total MS4 WLA** | **2,242.0** | **2.30E+12** | | **2.30E+12** |
| **Quantico Creek (A26R-03-BAC) & South Fork Quantico Creek (A26R-05-BAC)** | | | | | | |
| VA0088595 | Prince William County | Prince William County | 577.1 | 1.22E+12 | 1.46E+09 | 8.41E+11 |
| VAR040100 | Prince William County Public Schools | | | | | |
| VAR040115 | Virginia Department of Transportation | | | | | |
| VAR040117 | Town of Dumfries | Town of Dumfries | 259.9 | | | 3.79E+11 |
| VAR040115 | Virginia Department of Transportation | | | | | |
| | | **Total MS4 WLA** | **837.0** | **1.22E+12** | | **1.22E+12** |
| **North Branch Chopawamsic Creek (A26R-04-BAC)** | | | | | | |
| VA0088595 | Prince William County | Prince William County | 5.6 | 3.79E+10 | 6.32E+09 | 3.79E+10 |
| VAR040100 | Prince William County Public Schools | | | | | |
| VAR040115 | Virginia Department of Transportation | | | | | |
| VAR040069 | United States Marine Corps, Quantico | | | | | |
| | | **Total MS4 WLA** | **5.6** | **3.79E+10** | | **3.79E+10** |

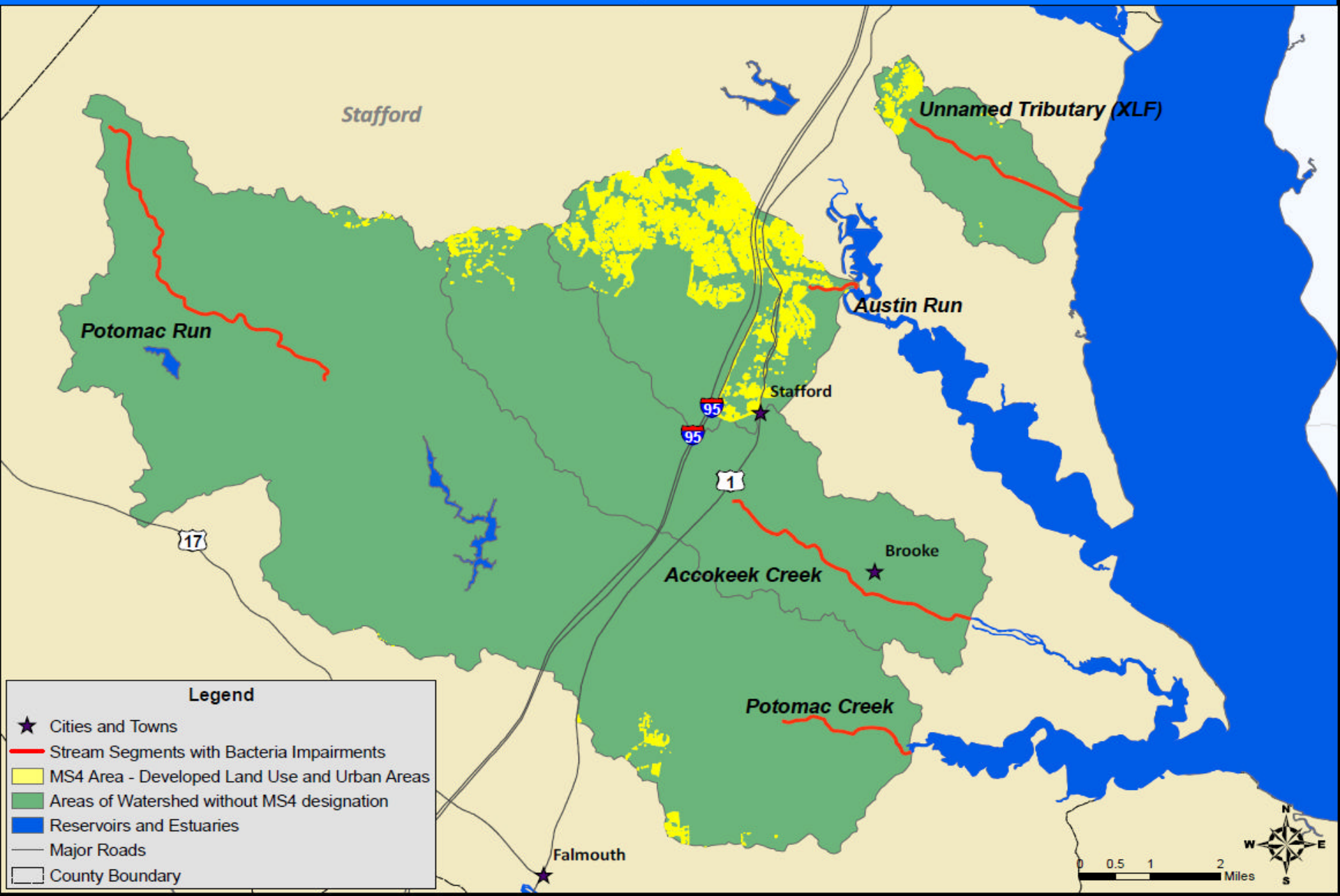
# MS4 Geographical Area
# Powells Creek, Quantico Creek, South Fork Quantico Creek, and North Branch Chopawamsic Creek



# DRAFT MS4 Allocations (Continued)

| Permit Number | MS4 Permit | MS4 Geographical Area | MS4 Acreage | Overall MS4 Allocation (cfu/year) | Allocation Unit Load (cfu/acre/year) | MS4 Allocation by Jurisdiction (cfu/year) |
|---|---|---|---|---|---|---|
| **Unnamed Tributary to Potomac River (A26R-07-BAC)** | | | | | | |
| VAR040056 | Stafford County | Stafford County | 121.0 | 2.08E+11 | 1.72E+09 | 2.08E+11 |
| VAR040071 | Stafford County Public Schools | | | | | |
| VAR040115 | Virginia Department of Transportation | | | | | |
| | | **Total MS4 WLA** | **121.0** | **2.08E+11** | | **2.08E+11** |
| **Austin Run (A28R-01-BAC)** | | | | | | |
| VAR040056 | Stafford County | Stafford County | 1537.3 | 9.03E+11 | 5.87E+08 | 9.03E+11 |
| VAR040071 | Stafford County Public Schools | | | | | |
| VAR040115 | Virginia Department of Transportation | | | | | |
| | | **Total MS4 WLA** | **1537.3** | **9.03E+11** | | **9.03E+11** |
| **Accokeek Creek (A29R-01-BAC)** | | | | | | |
| VAR040056 | Stafford County | Stafford County | 57.6 | 1.39E+11 | 2.41E+09 | 1.39E+11 |
| VAR040071 | Stafford County Public Schools | | | | | |
| VAR040115 | Virginia Department of Transportation | | | | | |
| | | **Total MS4 WLA** | **57.6** | **1.39E+11** | | **1.39E+11** |
| **Potomac Creek (A29R-02-BAC) & Potomac Run (A29R-03-BAC)** | | | | | | |
| VAR040056 | Stafford County | Stafford County | 29.8 | 1.05E+11 | 3.53E+09 | 1.05E+11 |
| VAR040115 | Virginia Department of Transportation | | | | | |
| | | **Total MS4 WLA** | **29.8** | **1.05E+11** | | **1.05E+11** |

# MS4 Geographical Area
# Unnamed Tributary (XLF), Austin Run, Accokeek Creek, Potomac Creek, and Potomac Run



# DRAFT *E. Coli* TMDL Expressions

| Watershed | Non-Point Sources (LA) cfu/year | Point sources (WLA) cfu/year | Margin of safety (MOS) cfu/year | TMDL cfu/year |
|---|---|---|---|---|
| Powells Creek | 5.25E+12 | 2.38E+12 | IMPLICIT | 7.63E+12 |
| Quantico Creek | 1.01E+13 | 1.32E+12 | IMPLICIT | 1.14E+13 |
| South Fork Quantico Creek | 2.76E+12 | 3.69E+10 | IMPLICIT | 2.80E+12 |
| North Branch Chopawamsic Creek | 3.78E+12 | 7.61E+10 | IMPLICIT | 3.86E+12 |
| Unnamed Tributary to Potomac River | 9.91E+11 | 2.22E+11 | IMPLICIT | 1.21E+12 |
| Austin Run | 3.93E+12 | 2.21E+13 | IMPLICIT | 2.60E+13 |
| Accokeek Creek | 6.48E+12 | 2.08E+11 | IMPLICIT | 6.69E+12 |
| Potomac Creek | 1.10E+13 | 1.74E+11 | IMPLICIT | 1.12E+13 |
| Potomac Run | 1.97E+12 | 6.21E+10 | IMPLICIT | 2.03E+12 |

# Next Steps:

- Comment Period for Materials Presented at the TAC Meeting extends from January 4, 2012 to February 3, 2012
- Comments should be submitted in writing to:

  Katie Conaway
  Katie.Conaway@deq.virginia.gov
  13901 Crown Court, Woodbridge, VA 22193
- Final Public Meeting and Release of Draft Report – Early February 2012. Date, Meeting Location, and Time are TBD.

# CONTACTS


**Katie Conaway**
**Virginia Department of Environmental Quality**
**Northern Regional Office**
**TMDLs and Water Quality Assessments**
**Phone: (703) 583-3804**
**E-mail: Katie.Conaway@deq.virginia.gov**

**Bryant Thomas**
**Virginia Department of Environmental Quality**
**Northern Regional Office**
**Water Quality Permitting, TMDLs and Assessments**
**Phone: (703) 583-3843**
**E-mail: Bryant.Thomas@deq.virginia.gov**

**The Louis Berger Group**
**Djamel Benelmouffok - dbenelmouffok@louisberger.com**
**(202) 331-7775**


THE Louis Berger Group, INC.

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VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY